THE

CYPRUS

AGRICULTURAL JOURNAL

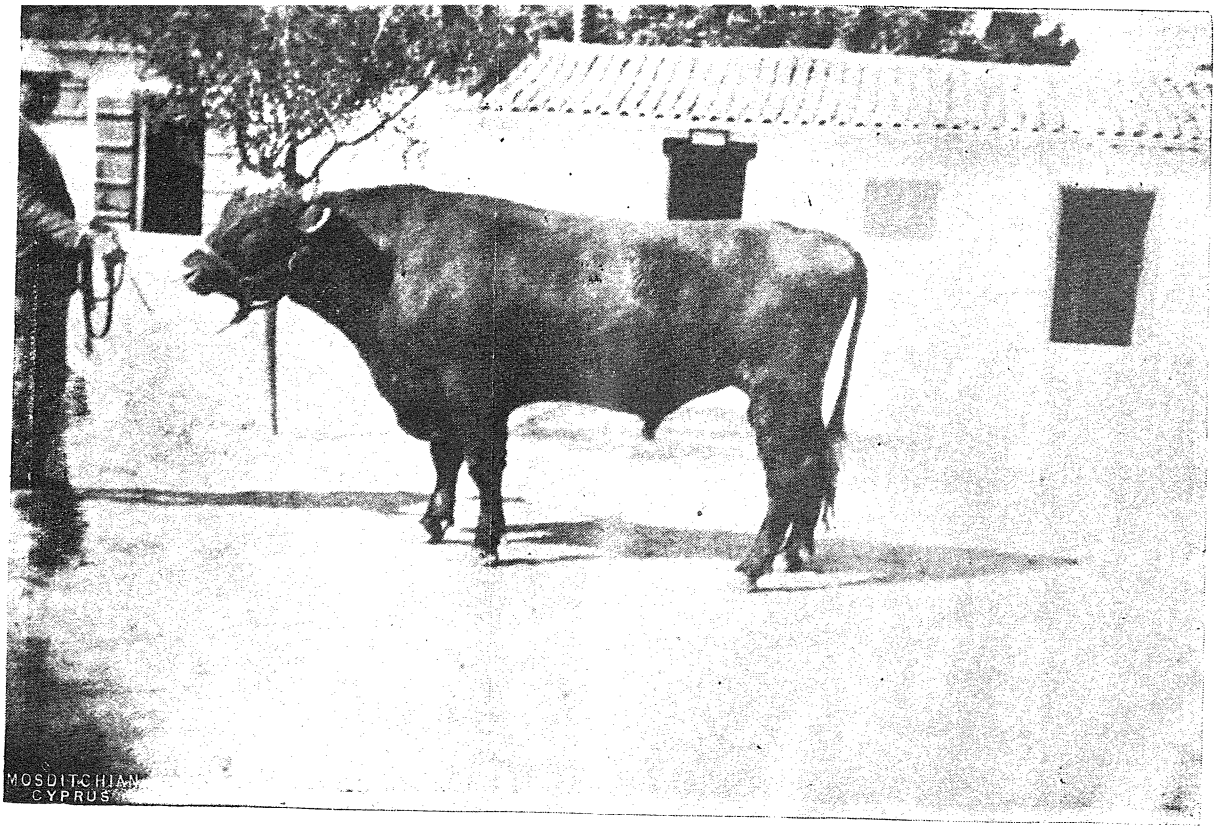
1936

(Volume XXXI)

INDEX

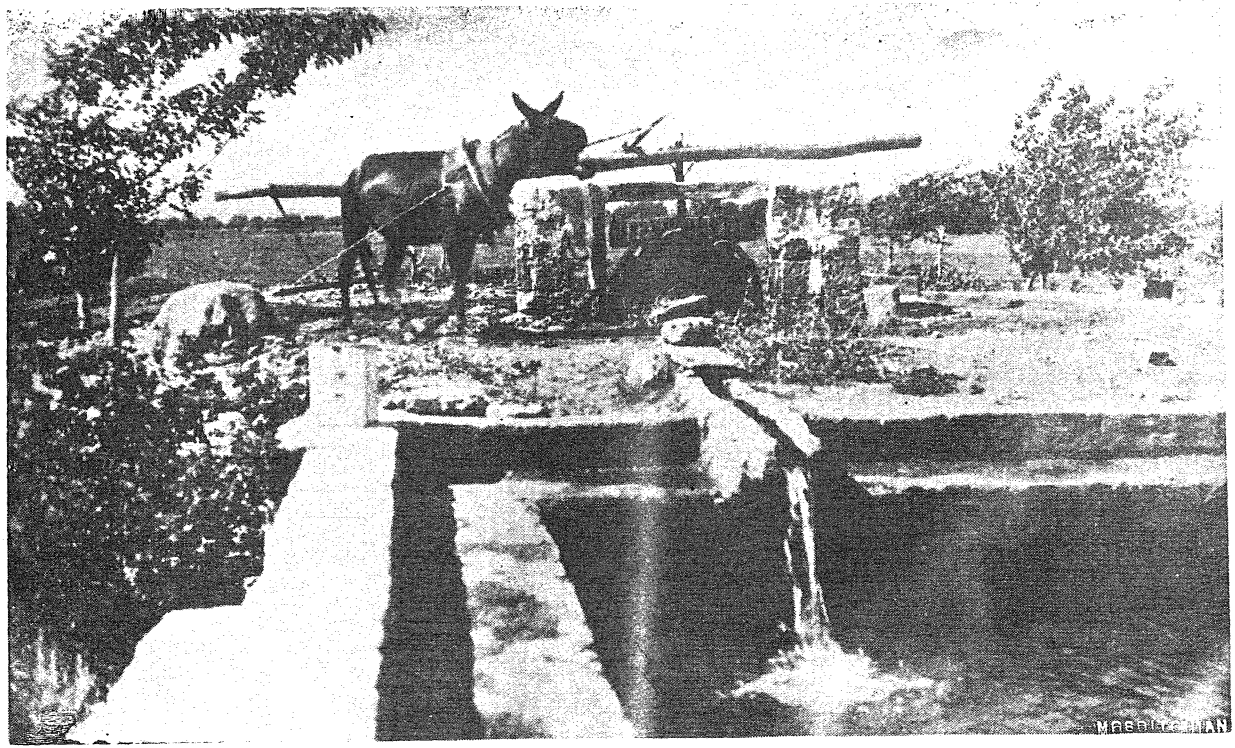
INDEX

CONTENTS



"Ilford Ambassador," a Dairy Shorthorn Bull.

CONTENTS



Cyprus Persian Wheel "Alakati."

CONTENTS

CONTENTS

The Saraclo—a village-made implement for levelling a field after sowing.

The Cyprus Agricultural Journal

A QUARTERLY REVIEW

OF THE

AGRICULTURE, FORESTRY AND TRADE OF CYPRUS

Vol. XXXI, Part 1 MARCH, 1936 Price 3cp.

EDITORIAL NOTES.

THE agricultural situation and outlook is on the whole satisfactory. The lack of rains in January and the first half of February have made the prospects for cereals in the Messaoria less favourable and in this area yields are likely to be less than in the previous year. In most other parts of the Island good rains have ensured good crops.

The demand and prices for most agricultural products since the beginning of the year have maintained a fairly good level. Exceptions to this are the difficulties in marketing wines and raisins, the fall in prices for cumin and aniseed, and a tendency for the market for oranges to be inactive.

Natural pastures and feed for animals are plentiful and the condition of live-stock is excellent.

* * * * * * *

ORANGE DAY CELEBRATIONS.

Orange day celebrations were held at Famagusta on 19th January, Morphou 28th January, and Lefka 1st March. At Famagusta the arrangements for the celebrations were ably organized by Agricultural Officer, Mr. A. Panaretos, and the programme of events included a parade of all schoolchildren of Varosha and Famagusta to the square in front of the Commissioner's Office. Various speeches were made, the Larnaca Amateurs Band provided music, there was some community singing and oranges were freely dispensed to the public. In the afternoon and evening, sports and entertainments were arranged. His Excellency the Governor and the Commissioner of Nicosia were present during the celebrations at Lefka. The celebrations at Morphou and Lefka were organized on similar lines to the programme arranged at Famagusta. Mr. I. Ierides, Mayor of Morphou, and M. Fadil, Mayor of Lefka, rendered valuable assistance in making the celebrations a success in their respective towns. These events are of considerable value in stimulating the interest in the production and local consumption of citrus fruits.

MEETING OF CITRUS GROWERS AT FAMAGUSTA.

A meeting of citrus growers and packers was arranged at Famagusta on the 27th January, 1936, where Dr. R. M. Nattrass, the Government Mycologist, gave an address on the cause and prevention of wastage in citrus fruits. The meeting was well attended and representative of the leading citrus growers, packers and shippers.

* * * * * * *

HALF-YEARLY MEETING OF AGRICULTURAL OFFICERS.

The half-yearly meeting of Agricultural Officers in charge of Districts was held at Nicosia on the 29th January. At these half-yearly meetings opportunity is taken to discuss problems arising in the course of the duties of Agricultural officers and of agricultural problems that are common to all Districts.

* * * * * * *

ARBOR DAY.

The holding of Arbor Day celebrations in village schools where a school garden is established, was revived this year and celebrations were held for Greek Schools on the 30th January, 1936, and for Moslem Schools on the 31st January, 1936. Agricultural, Forest and Education Department officers assisted the schoolmasters in the celebrations.

* * * * * * *

CYPRUS SHIPPERS' ASSOCIATION.

The Cyprus Shippers' Association, which was formed for the purpose of facilitating and promoting the Colony's Trade, was duly registered at the Court on 29th February, 1936. Copies of Memorandum and Articles of Association will be on view at the Offices of the Commissioner, Famagusta, Larnaca, Limassol, Paphos and Nicosia, and at the Agricultural Department, Nicosia.

Forms of application for membership will also be obtainable at these offices and those desirous of becoming members of the Association should submit applications on these forms before the end of March. The first general meeting of the Association will take place in the Offices of the Department of Agriculture, Nicosia, at 11 a.m. on Wednesday, 1st April.

* * * * * * *

NOTES ON PLANT DISEASES.

Heavy attacks of the spring rust *Puccinia glumarum* have already appeared on the wheat in some localities. If weather conditions continue suitable these may develop into an epidemic. The stem rust *Puccinia graminis* has not yet been seen.

Some damage was caused to the barley during December and January by the Powdery Mildew *Erysiphe graminis* which made some headway during the cold wet weather and appeared to be the cause of much of the yellowing of the crop.

The occurrence of an outbreak of *Peronospora* of the Vine is entirely dependent on weather conditions. All growers should be in readiness to combat the attack should one break out. Officers of the department will keep a sharp look out for the first signs of the disease during the dangerous period. Should conditions appear suitable vine should be sprayed with Bordeau Mixture or any of the ready-made copper fungicides on the market. Growers who suspect the disease should communicate at once with the nearest Agricultural Officer.

* * * * * * *

SILKWORM EGGS PRODUCTION.

The quantity of silkworm eggs available for hatching in 1936 season is 4,130 ozs., of which 2,980 ozs. were produced locally and 1,150 ozs. were imported. The amount of eggs used for hatching in 1935 was 3,970 ozs.

The price offered for silkworm eggs started at 10*cp.* per oz. and reached 3*s.* per oz.

The silkworm eggs produced in the Sericultural Station of the Agricultural Department have been sold at the usual price of 4½*cp.* per dram (4*s.* per oz.).

All the silkworm eggs were hibernated at Pedhoulas where accommodation was secured by the Agricultural Department and the eggs were removed for disposal on 20th February, 1936. Twenty-one persons have received silkworm egg production licences entitling them to produce silkworm eggs during the 1936-37 season.

* * * * * * *

DEMONSTRATIONAL SILKWORM REARING IN GIRLS' SCHOOLS DURING 1936.

Arrangements have been made in consultation with the Director of Education for demonstrational silkworm rearing to be carried out this season in 152 girls' schools, and one dram of silkworm eggs has been given by the Agricultural Department to each of these schools.

The rearing will be carried out by the schoolgirls of the three upper classes under the supervision of the schoolmistress.

Sericultural Officers and Agricultural Officers will visit the schools to give all necessary instructions in connection with the rearing.

In schools where there are more than one mistresses the rearing will be under the special charge of one of the mistresses.

A prize of £1 will be awarded in each district to the schoolmistress who has carried out the best demonstration while all other schoolmistresses who carry out a satisfactory demonstration will receive a prize of 10*s.*

Cereal Experiments at the Central Experimental Farm.

BY B. J. WESTON *and* CH. KOUMIDES.

GENERAL.

THE purpose of the cereal experiments at Central Experimental Farm is to obtain a more accurate knowledge of the principal factors limiting the production of cereals under conditions which may be taken to be fairly representative of the chief cereal-producing areas of the Island. The purpose of these notes is to give a short account of what has already been done and what is being done to accomplish the objects in view.

It is well known that results of field experiments are unreliable unless the experiments are repeated over a period of years (usually 5 for annual crops) owing to the influence of certain uncontrollable factors such as weather. Thus, inasmuch as that the cereal experiments at Central Experimental Farm have only been in progress for so short a time, little in the way of tangible results are as yet forthcoming. At the same time a certain amount of useful information has already been obtained and (what is much more important at this stage) the staff at the Central Experimental Farm has gained much useful experience in conducting experiments and in methods of collecting records. Since its inception the work has been hampered by the fact that the farm was not properly equipped for ordinary farm purposes, still less for carrying out accurate experimental work. In addition the junior staff and labourers have been tackling a job to which they were totally unused ; and further the officers responsible for the experimental work were also those upon whom the carrying out of the development programme of the farm itself principally devolved. In the circumstances much of the experimental work which should have been started has had to give place to the more urgent development work. This latter difficulty will continue to some extent until all the development work is completed probably in the spring of 1937.

It is hoped, however, that the results obtained in 1935 and those which will be obtained at the end of the harvest this year will provide the first data which can be used as a basis for attacking the many problems presented.

OBSERVATION PLOTS.—(WHEAT, BARLEY AND OATS).

Forty-five observation plots were laid down in 1934–35 ; and there are 55 this year. These consist of small plots $17' \times 15'$ and their purpose is to enable preliminary observations to be made on new varieties of cereals which are imported, or any specially-selected local strains which appear worthy of inclusion. If a variety from the observation plots is found sufficiently promising it is " promoted " to a variety trial where it is tested against a standard local variety.

The following records are compiled from varieties in observation plots from notes written up at fortnightly intervals. Area of plot in square feet ; Date of sowing ; Fertilizer used : (*a*) at sowing, (*b*) for top dressing ; Quantity of seed sown ; Date of germination ; Date or dates of irrigation ; Tillering ; Date first appearance of ears ; Number of tillers bearing ears ; Date flowering ; Date of maturity ; Date of harvesting ; Weight of sheaves ; Yield : (*a*) grain, (*b*) straw ; Weight per kilé ; Quality of grain ; Remarks.

WHEAT.

(1) CULTIVATION EXPERIMENT.

The object of this experiment is to study the relative effects of cultivation by the local wooden plough, the modern iron plough working at the same depth as the wooden plough (5″); the modern plough ploughing deeper at a depth of approximately 9 inches; and ploughing by tractor at approximately 9 inches.

The variety used is a standard local variety " Kyperounda " and each plot is $\frac{1}{4}$ donum in extent. This experiment had of necessity to be laid out on the strip system to enable the different methods of cultivation to be carried out effectively.

The plan of the experiment is as follows :—

d (1)	b (1)	c (1)	a (1)	c (2)	d (2)	a (2)	b (2)	d (3)	a (3)	c (3)	b (3)	c (4)	a (4)	d (4)	b (4)

(*a*) = native wooden plough (approximately 5 inches);
(*b*) = modern iron plough (approximately 5 inches);
(*c*) = do. do. (approximately 9 inches);
(*d*) = tractor plough (approximately 9 inches);

The 1935 results from the experiment show a significant increase in yield in favour of tractor ploughing, but no useful results can be expected from this experiment for several years.

(2) FERTILIZER EXPERIMENT (TYPES).

This experiment is designed to test the effect of nitrogen fertilizer, phosphatic fertilizer and FYM when applied alone, and is laid out as a Latin Square according to the plan given below :—

(*a*) 1	(*b*) 1	(*c*) 1	(*d*) 1
(*d*) 2	(*c*) 2	(*a*) 2	(*b*) 2
(*b*) 3	(*a*) 3	(*d*) 3	(*c*) 3
(*c*) 4	(*d*) 4	(*b*) 4	(*a*) 4

Treatments :

a. { 8 okes per donum sulphate of ammonia before sowing ;
     8 ,, ,, nitrate of soda as a top dressing :

b. FYM 3 tons per donum ;

c. Superphosphate 40 okes per donum before sowing ;

d. Control ; (no manure or fertilizer).

The 1935 results indicate that the yields obtained when nitrogenous fertilizer and FYM are applied, are significantly higher than the control and the mean of all plots.

(3) FERTILIZER EXPERIMENT (AMOUNTS).

This experiment is designed to test the effect on yield of nitrogenous or phosphatic fertilizers applied together at different rates per donum, and is laid out in a Latin Square according to the plan given below :—

a (1)	b (1)	c (1)	d (1)
c (2)	d (2)	a (2)	b (2)
b (3)	a (3)	d (3)	c (3)
d (4)	c (4)	b (4)	a (4)

Treatments :

(*a*) { 4 okes Sulphate of ammonium per donum before sowing ;
20 ,, Superphosphate per donum before sowing ;
4 ,, Nitrate of soda as top dressing ;

(*d*) { 8 okes Sulphate of ammonium per donum before sowing ;
40 ,, Superphosphate per donum before sowing ;
8 ,, Nitrate of soda as top dressing ;

(*b*) { 16 okes Sulphate of ammonium per donum before sowing ;
80 ,, Superphosphate per donum before sowing ;
16 ,, Nitrate of soda as top dressing.

(*c*) Control—No manuring.

The 1935 results indicate that a significant increase in yield is obtained with the double dose of complete fertilizer (*b*). If financially treated, however, the increased yield of 1.5 kilés per donum does not pay for the extra quantity of fertilizers applied in the double dose.

Both these fertilizer experiments are preliminary in character and will be followed up by more complete experiments which, it is hoped, it will be possible to lay down in the autumn of this year.

(4) ROTATION EXPERIMENT.

This experiment is designed to ascertain the best rotation system which can be adapted to ordinary practice in the Messaoria.

The rotations included are :—

(1) Wheat followed by bare fallow ;
(2) ,, ,, leguminous green manuring crop (Vicos) ;
(3) ,, ,, crop (Vicos) harvested and stubble ploughed ;
(4) ,, unmanured year after year.

The current season being the first year of the experiment proper, all plots are sown to wheat.

(5) SEED RATE EXPERIMENT.

This experiment is designed to test the response of yield to different seed rates and is arranged in the form of a Latin Square as in plan given below :—

a (1)	c (1)	d (1)	b (1)
d (2)	b (2)	a (2)	c (2)
c (3)	a (3)	b (3)	d (4)
b (4)	d (4)	c (4)	a (4)

a : 9 okes per donum
b : 11 ,, ,,
c : 13 ,, ,,
d : 15 ,, ,,

No significant results have as yet been obtained from the experiment in 1935 the mean square due to error being higher than the mean square due to treatments.

The foregoing experiments are being conducted as a series on the same land over a period of 5 years. The variety used is the local wheat variety " Kyperounda ", the size of plots in all experiments being $\frac{1}{4}$ donum with a path of 1 yard between plots.

VARIETY TRIALS.

(1) *Wheat.*—This is a trial of 8 varieties, two of which are local ones. In view of the large number of plots which would have been necessary if this was laid down as a Latin Square, the experiment was laid out on the " equalized randomized block " system, each variety being replicated 4 times, as in plan below, the plots being $\frac{1}{10}$ of an acre in extent (11 × 11 yards) with a path of 1 yard wide between plots.

					Varieties
A	D	C	B	Block I	A = B.X.I.P.I.
E	H	C	F		B = Gluyas Early
F	A	H	C	Block II	C = Marocaine 024
B	E	D	B		D = Hamira 436
H	C	F	A		E = Hugenot
D	C	B	E	Block III	F = Rietti
C	B	E	D		G = Psathas
G	F	A	H	Block IV	H = Kyperounda
Block 1	Block 2	Block 3	Block 4		

(2) *Barley.*—The barley variety trial contains 8 varieties (6 imported and 2 local) and the same layout plan is followed as is described above for wheat. The plot size is also the same.

In this trial A = Egyptian
B = Black Barley (Tripoli)
C = Mariotti
D = Coast
E = South African 6 row
F = Cyprus Black
G = Paphitiko
H = 4.A.

(3) *Oats.*—This is a trial of 4 varieties put down in a simple Latin Square, the varieties included being Texas, Cawra, Cyprus Black and "0238". Plot size being the same as in the Wheat and Barley Variety trials.

These 3 experiments were laid down in December, 1935, on land which had previously been bare fallowed. All plots in all 3 experiments received at the time of sowing a dressing of 3 okes per plot 4–12–3 fertilizer. The Imported Varieties under trial in each case being those which from their performances in Observation Plots have been thought worthy of inclusion in a yield trial against standard local varieties.

Injurious Insects of Cyprus.

BY H. M. MORRIS, M.Sc., F.R.E.S., *Government Entomologist, Cyprus.*

INTRODUCTION.

THE records on which this list of injurious insects and mites of Cyprus is based have mostly been obtained during the past thirteen years, there being very few records dating from before that period. These records were obtained partly by Mr. D. S. Wilkinson, who was Government Entomologist in Cyprus from 1923 to 1926, and by myself and my assistants since my arrival in the Colony early in 1927. While there are doubtless many more species causing slight or rare damage to crops, the species listed below are probably those causing most frequent damage. Mention is also made of those species causing injury or annoyance to man and to domesticated animals so far as information concerning those species is available. I am indebted to the Imperial Institute of Entomology for the identification of most of the insects mentioned, and to Mr. E. E. Green for the identification of Coccidæ. The valuable assistance given by these authorities is gratefully acknowledged.

A few species are included in this list which have not actually been recorded as causing damage to cultivated plants in Cyprus, but which have been so recorded elsewhere, and whose occurrence in Cyprus it therefore appears desirable to place on record.

Most of the records available dating from prior to 1923 are those contained in the *Cyprus Journal*, later the *Cyprus Agricultural Journal*, and other publications of the Agricultural Department. These references are chiefly to the commoner pests but two or three references are to less usual pests and these have been included in the present list.

The chief published list of the insects of Cyprus appears to be that of Unger and Kotschy (1). A list of butterflies has been published by Turner (2), and there is a short list of moths in the *Handbook of Cyprus* (1920 edition), the list of butterflies in that edition being amended in the 1930 edition, the latter being based on Turner's list. Further study of the moths is believed to have been made but has not been published, so far as is known.

There are a number of scattered references to the occurrence of insects of economic importance in Cyprus (3) and (4), some of which references have been seen but are not included in the list of references given herewith. The published accounts referred to here and included in the list of references are all those known which deal at all fully with the occurrence in Cyprus of insects of economic importance, but papers consisting only of a description of a new species are not included, even if the new species described is of economic importance. Publications of the Cyprus Agricultural Department are not included in this list of

(1) Unger and Kotschy, *Die Insel Cypern*, Vienna, 1865.

(2) Turner, H. J., "The Butterflies of Cyprus," *Trans. Ent. Soc.*, 1920, pp. 170-207.

(3) Freeborn, S. B., "Citrus Scale Distribution in the Mediterranean Basin," *Journ. Econ. Ent.*, XXIV, No. 5, 1931, pp. 1025-1031.

(4) Hall, W. J., "The Insect Pests of Citrus Trees in Egypt," Ministry of Agriculture, Egypt, Tech. and Sci. Service, *Bulletin* No. 45.

references. These publications consist of leaflets, bulletins, annual reports and the *Cyprus Agricultural Journal*, formerly the *Cyprus Journal*, and contain numerous references to insects pests, which have been embodied in the present account.

The world distribution of the various injurious insects mentioned in this list has not been gone into detail but in the case of a few species this distribution may be briefly referred to.

Four species of insects which have up to the present been recorded only in Cyprus, cause damage to crops, etc, here, although their host plant or animal has a much wider distribution : *Anthonomus cyprius*, *Thaumetopœa wilkinsoni*. *Asphondylia capsici* and *Hypoderma œratum*. It is possible that more detailed study in neighbouring countries may show these species to be of wider distribution.

Some other insects occur as pests in Cyprus and also in neighbouring countries, but do not occur elsewhere although their host plant is more widely distributed. An example of this is *Syringopais* (*Nochelodes*) *temperatella*, which occurs as a pest in Cyprus and also in Syria and Palestine, and possibly in other adjacent countries, but is not more widely distributed although its cereal host plants are widely distributed.

In the case of a number of pests which are not limited to one food plant or to a group of closely related species, their natural range is far wider. Example of such pests are *Heliothis obsoleta* and *Prodenia litura* which are to be found almost throughout the world, their distribution having very probably been unwittingly assisted by man. Other pests, although occurring over a wide area which includes Cyprus are not, however, distributed throughout the world, or throughout the range of their particular food plant.

Many injurious insects owe their present wide distribution to having been carried by man in fruit or other plant products from one country to another, until at the present time, as for example in the case of *Cydia pomonella*, they occur practically wherever their host plant is grown. Not all such pests have yet attained to their fullest possible distribution and for example, *Ceratitis capitata* has not been able to establish itself permanently in North America where there are large areas suitable for its development and where it could without doubt become a very serious pest.

Several of the more important pests occurring in Cyprus have doubtless obtained a footing here through their having been accidentally introduced by man. Examples of such pests are *Platyedra gossypiella* which was most probably introduced a number of years ago in cotton seed imported from Egypt without sufficient precautions being observed, and *Phthorimœa operculella* which seems to have been introduced either in a consignment of potato seed from France about 1916, or more probably about that time in imported sacks which had previously contained infected potatoes.

The distribution of pests from country to country, or between different areas in the same country, is now prevented as far as possible by the enforcement of quarantine regulations controlling the importation and distribution of plants or plant products which might possibly carry with them pests not already established in the importing country or area, or

new infestations of pests already under control. These quarantine regulations are constantly becoming more severe, yet in spite of them pests are still able to appear in countries where they have not hitherto been known, as for example the occurrence of *Ceratitis capitata* in Florida a few years ago.

From the point of view of Cyprus there is a group of insects of very great importance: those which are serious pests elsewhere and even in neighbouring countries but which have not so far become established in Cyprus although conditions in Cyprus appear to be very suitable for them. This group of insects includes *Chrysomphalus aonidum* which is a serious pest of citrus trees in Syria, Palestine, Egypt and elsewhere, and also attacks a large variety of other plants. *Phylloxera vastatrix* is another very serious pest in neighbouring countries which does not occur in Cyprus. Precautions have been taken for some years past to prevent, if possible, the introduction into Cyprus of these and other injurious insects, although it is surprising that those occurring in neighbouring countries were not introduced into Cyprus long ago before such precautions had been thought of.

It is also of interest to note that several species of insects which are injurious to crops in other countries and which occur in Cyprus, do not cause appreciable injury here, or cause much less serious damage. In this connection may be mentioned *Lecanium* (*Saissetia*) *oleæ*, which is only an occasional pest of the olive and citrus trees in Cyprus although it is a serious pest of citrus trees elsewhere, and *Aspidiotus hederæ* which is a common and sometimes serious pest of carob, wattle and a variety of other plants in Cyprus but does not appear to attack citrus trees here as it is reported to do in Italy and France.

A fuller account of the most important pests in Cyprus with recommendations for their control and instructions for the preparation of insecticides, has already been published ["Insect Pests and Fungus Diseases of Cyprus and their Control," *Bulletin* 3 (Entomological Series), Agricultural Department, Cyprus].

[*to be continued in the June issue.*]

Diseases of Poultry

WITH SPECIAL REFERENCE TO THOSE OCCURRING IN CYPRUS.

BY R. MOYLAN GAMBLES, *Veterinary Officer.*

POULTRY keeping in Cyprus is essentially a peasant industry. The following account of the diseases which occur among the poultry in the Island, or are liable to occur, is therefore primarily intended to be a simple guide for the progressive villager, and to enable him to check disease when it occurs in his flocks, and avoid the conditions that favour its spread. It does not profess to be a profound or complete exposition of the subject, or to be the outcome of any original work.

Poultry are liable to a great many diseases, most of which occur in Cyprus. Many of them closely resemble each other, and can only be distinguished by examination in the laboratory. The following symptoms should be looked for. In most diseases the birds become dull, and often do not feed. There is often a paleness of the combs and wattles, especially in chronic and wasting diseases. In more acute diseases, the combs and wattles may be a dark purplish red. Diarrhœa is often present, and may be green or yellow, and often foul-smelling. Birds often look dejected and droop. They sometimes become lame or paralyzed. Death may be sudden, or after many weeks' sickness. Sometimes the birds recover. These symptoms are not diagnostic, and different birds suffering from the same disease may show quite different symptoms.

In most diseases there is no curative treatment which is of any use. The important thing is to prevent the spread of the disease. It will be seen from the descriptions that follow, that it is not easy for the owner to diagnose the disease himself, so carcases should be sent to the laboratory as soon as possible, and when the cause of the disease is discovered, its control can be commenced.

FOWL POX. Also called " Roup " and " Fowl Diphtheria."—This is the commonest disease of poultry in Cyprus, and one of those that are easily recognized. It exists in several forms, very different in appearance, of which more than one can occur together. The commonest form is that in which the mouth and throat are covered with soft membranous scabs, which, when pulled off, leave a raw and bleeding surface. These scabs often occur in the larynx and trachea, and may affect the lungs and the heart. In this form, mortality is high ; and when the internal organs are affected, death may occur suddenly.

In another form of the disease, the skin is affected with scabs, usually on the comb and wattles, but sometimes on the legs and breast. When all the scabs are outside, the birds usually recover in two or three weeks.

There is a third form of the disease which affects the eyes and nose. At first there is a watery discharge, which soon becomes thick and sticky. Discharge often collects in the eyes, where it turns to a hard cheesy mass, completely hiding the eyeball. Cheesy masses may also collect in the cavities of the skull, causing a large swelling on the side of the face between the eyes and the nostril.

In all three forms, it is possible for the disease to strike inwards, and poison the blood. The bird then dies very quickly.

It is not wise to try to treat the birds, as the disease spreads rapidly. The safest way to deal with an outbreak is to slaughter all the ill birds. If too many are affected for slaughter to be feasible, they should be kept far away from the healthy birds. The healthy birds can be vaccinated, and after two or three weeks they will be safe from infection for several months. Vaccination will not cure sick birds. If it is desired to treat valuable birds, this is done by removing the scabs from the throat and mouth with forceps, and painting the raw surface with a mixture of tincture of iodine and water in equal parts. When the eyes or nose are affected, these may washed out with Boracic powder dissolved in hot water, or the whole head may be dipped in a solution of Potassium permanganate.

When there is swelling of the side of the face, the discharge can be removed surgically by opening up the cavities of the skull. Skin lesions can be treated with oil containing 5% carbolic. The scabs are carefully removed, and the oil applied twice daily to the raw surface.

SPIROCHAETOSIS.—This disease is caused by a minute parasite invading the blood. It is spread from bird to bird by the bite of fowl-ticks, and is common in Cyprus. There is no symptom peculiar to the disease. Birds just look dull and drooping, and die in large numbers. In acute cases, the comb and wattles are congested and dark red. In more chronic cases there may be paralysis. It can only be recognized by microscopic examination of the blood, which should be taken while alive, as the parasites disappear shortly after death.

Affected birds can often be cured by injecting a drug called "Atoxyl," but this is obviously no use unless the ticks which carry the disease, are attacked at the same time. The ticks live in cracks in the hen-house, or under the bark of neighbouring trees. They come out by night, and attack the birds while roosting. If the hen-house is a cheap wooden one, it is best to burn it, and build a new one. If this is not possible, the whole of the hen-house should be painted or tarred, special attention being paid to all cracks and crevices, which should be filled in with gypsum. Whitewashing is bad, as it tends to flake off, and the flakes provide a hiding place for ticks. In some cases, it is possible to go over them with a blow-lamp. An additional measure is to stand the feet of the roosts in tins full of water. As long as there is water in every tin, and no part of the roost touches the side of the hen house, the ticks will not be able to reach the birds. The roosts should be far enough from the walls for no part of the bird to touch the wall or the ticks will walk up the feathers. Roosts which are fixed to the side of the hen-house are bad.

TUBERCULOSIS.—This is a chronic disease, and the birds do not usually appear to be very ill, but are thin and pale. Sometimes they go lame. Where only young birds are kept, there are not many deaths, but in flocks of older birds, the mortality may be very heavy. During life, the disease can be detected by the Tuberculin Test. In birds that have died from the disease, tuberculous nodules will be found in the liver

or along the intestine. These nodules are round or oval and of any size up to half-an-inch across. At first they are soft, but as they grow larger and older, the contents become hard and cheesy. The lungs are hardly ever affected.

There is no treatment for the disease, and all affected birds should be killed and burnt, to prevent spread. The houses should be thoroughly cleaned and disinfected.

FOWL CHOLERA.—This is very serious disease in that it is rapidly spread, and the mortality is high. The course of the disease is short, and the birds die rapidly. The bird shows no symptoms peculiar to the disease, and it is not possible to diagnose it, except by laboratory examination of a freshly-dead bird, when the germ causing the disease can be found in the blood in large numbers. Ill birds just appear drowsy, and often show a discharge from the nostrils, or a greenish or yellowish diarrhœa, which sometimes contains blood. The combs and wattles are usually dark red, the birds often show excessive thirst. Sometimes birds die suddenly without showing any symptoms.

There is no treatment, and when the disease is definitely diagnosed, all ill birds should be slaughtered. A vaccine can be prepared, and if given to the healthy birds, it will lessen their chance of becoming infected.

FOWL TYPHOID.—This is another serious disease, and cannot be distinguished from Fowl Cholera except by laboratory examination of a freshly-dead bird. The combs and wattles are frequently paler than normal, and the bird becomes very weak and thin, sitting about drowsily and with the head drooping. There is usually a sulphur-yellow diarrhœa. Sometimes birds die suddenly, as in Fowl Cholera, but the course of the disease is usually slower, and the spread less rapid. Very careful disinfection is necessary, because soil contaminated with droopings can harbour the germ which causes the disease for a very long time.

There is no treatment, and recovered birds are carriers of the disease, so as soon as definitely diagnosed, all affected birds should be slaughtered and the rest of the flock vaccinated to prevent them becoming infected.

COCCIDIOSIS.—This disease is caused by a minute parasite, occurring in various parts of the intestine. The disease mainly affects young chicks (two weeks to three months). There is grey diarrhœa, which is often blood tinged. The disease can be diagnosed by microscopical examination of the droopings of the chicks to see if coccidia are present. When older birds are affected, the disease is usually chronic and often causes paralysis.

Treatment is not very satisfactory, but birds sometimes recover if fed on sour milk (*yaourt*), or milk containing a very small amount of iodine. The most important thing is to prevent the birds re-infecting themselves from their droppings, by scrupulous cleanliness. Chicks should be kept in cages with wire-mesh floors, so that the droppings will fall through onto a tray below, where they must be swept up daily, and burnt.

B.W.D. (*Bacillary White Diarrhœa*).—This is mainly a disease of young chicks, and when these are artificially incubated, it causes heavy losses. When chicks are hatched by the hen, the disease spread more slowly. Fortunately it is not known to occur in Cyprus. The chicks show a yellowish-white diarrhœa during the first few days of life, and die in large numbers. Those that recover harbour the disease in the ovaries, and lay eggs which hatch into affected chicks. No treatment is possible.

FOWL-PLAGUE AND NEWCASTLE DISEASE—are two other serious diseases of poultry, which fortunately do not occur in Cyprus. But *Fowl-Plague* is very common in Egypt, so care must be taken that it is not accidentally introduced. The two diseases are almost indistinguishable, except by long and complicated tests in the laboratory. There are no characteristic symptoms. When once a bird becomes ill, it nearly always dies.

LARYNGO-TRACHEITIS—is another infectious disease of poultry, involving, as its name implies, an inflammation of the larynx and trachea, which are found, after death, covered with a sticky discharge, and full of clots of blood on and under the mucous membrane. Affected birds cough frequently, and often show a characteristic gasping respiration. It has never definitely been recorded in Cyprus, but it is possible that it may occur. Affected birds should be isolated, or preferably slaughtered, and the premises carefully disinfected.

BLACKHEAD—is mainly a disease of turkeys, but it sometimes affects chickens. It has never been found in Cyprus. It is characterized by an inflammation of the intestines, and yellow spots on the liver. It must not be confused with tuberculosis, in which the nodules are more spherical, and have a hard cheesy centre. Sometimes the heads of young turkeys become a purplish black, but this is not a frequent symptom, and may occur in many other acute infections.

PARALYSIS.—Paralysis and other forms of lameness are commonly met with among poultry, and arise from many different causes, such as worms, tuberculosis, coccidiosis, chronic spirochætosis, and bad feeding. If the paralysis is only slight, it may often be cured by dosing the bird for worms, or giving green food. But where due to tuberculosis, the bird will get progressively worse, and had better be destroyed.

There is also a specific form of paralysis, which is caused by a swelling of the nerves of the legs or wings. Some authorities think that this disease may be infectious, but most do not believe this. Only two birds have been found in this condition in Cyprus, all other cases of lameness and paralysis being due to other causes.

LEUCAEMIA—is a disease of the blood-forming organs, and the blood is of a pale colour, owing to the presence of too many white corpuscles. The birds become pale and weak, and may die suddenly. It is uncertain whether or not the disease is infectious. It has never been recognized in Cyprus. There is no treatment known.

GOUT—is due to some fault in feeding, usually by too rich a diet, and is not common in Cyprus. There are two forms, one affecting the joints and making the birds lame, and the other affecting the internal organs, and often causing sudden death. Crystals of uric acid cover the liver or heart, giving them a white glistening appearance.

NUTRITIONAL ROUP.—This consists of a running at the nose and eyes, which results from wrong feeding, usually from not enough green food. The discharges may collect in the eyes and skull cavities in the same way as they do in Fowl-pox, and can be treated in the same way. Nutritional roup must be carefully distinguished from Fowl-pox. There will be no scabs on the combs and wattles, or inside the mouth. The back of the throat and gullet, however, often show small white pimples. The disease is not infectious, but it often comes on slowly and spreads through the whole flock. This is not because it is passed from one bird to another, but because the whole flock has been suffering from a deficiency of green food for some time, and are beginning to suffer from the effects of it. If the diet is corrected, and the birds affected are well cared for, most of them will recover.

WORMS.—These can either be round-worms, or tapeworms. There are two kinds of intestinal roundworms commonly occurring in Cyprus. The smaller one is about half-an-inch long, and does no harm unless it is present in very large numbers. The larger one varies in length from one to five inches, and is more harmful. These worms are transmitted direct (*i.e.* the eggs are passed out with the droppings, and birds re-infected by swallowing them).

The tapeworms are made up of a string of flat segments. There are many different kinds, and a number of them are to be found in Cyprus. When these occur in large numbers, they can make the birds very weak, and may cause death, either directly, or by bringing the bird into a condition where it is easily affected with other diseases. A few worms in a bird will do it no harm, and are almost unavoidable, but care should be taken that the numbers do not increase, or heavy losses will occur. The life-history of the worm is indirect. The egg is passed with droppings, and will only develop if it is eaten by a slug, earthworm, beetle, or house-fly, etc. It develops inside these, and if the intermediate host is swallowed by the hen, then the worms develop into their adult form.

There are three ways of controlling tapeworms in poultry :—

(i) by dosing the birds from time to time, so as to clear out the worms which are already present, and burning the droppings, with the worms passed out in them. One teaspoonful of freshly-powdered areca nut in a mash for every ten birds is often a satisfactory dose.

(ii) by destroying the droppings regularly, before flies, beetles, etc., have time to eat the eggs contained in them.

(iii) by reducing the numbers of flies and slugs. Flies can be controlled to a considerable extent by keeping all the premises clean. Slugs are less easily controlled, but in Cyprus these are of less importance than the flies.

Tapeworm disease can often be recognized by seeing pieces of the worm in the birds' droppings, although it is not always easy to find them. The droppings are often bloodstained. The best way of recognizing the disease is to open up a dead bird, when the worms will be found in numbers in the intestine.

There is another kind of worm that causes serious harm in poultry in many parts of the world, but fortunately it does not occur in Cyprus. This does not live in the intestine, but in the trachea, and causes a disease called "Gapes." The trachea becomes full of worms and the bird has difficulty in breathing, and keeps its mouth open and gasps in a characteristic fashion. Birds become very weak, and large numbers die from choking.

LICE AND FLEAS.—There are many different kinds of lice and two kinds of fleas that affect poultry. The lice live on the birds all their life, laying eggs, among the feathers. These eggs hatch into young lice, similar to the adults in everything except size. The fleas, on the other hand, lay eggs which fall off the bird, and hatch into small white maggots which live among the dust of the hen-house floor. When these have undergone various changes, and hatched into the adult flea, they jump on to the bird, and commence their parasitic existence.

There is no record of either flea having been found in Cyprus, but the lice are very common. A few of them will do no harm, but where they are numberous the bird is made weak with continued scratching, and is more liable to other diseases.

Lice are quite easily removed, either by rubbing sodium fluoride into the skin or by painting the roosts with nicotine sulphate. When the birds' settle down on the perches, the warmth of their bodies causes the nicotine to give off fumes which kill the lice. If a thick sheet of paper is laid under the perch, next morning an enormous number of dead lice will be found among the droppings on the paper.

TICKS.—These have been mentioned before, under Spirochætosis, but it must not be thought that this is their only danger. Even where this disease is not present, the ticks still do harm, and make the birds weak by the amount of blood which they suck, and by interfering with the birds, rest at night. The ticks can be attacked as mentioned before. The young ticks which are frequently found clinging to the birds by day, may be destroyed by applying a mixture of one part of petroleum with five or six parts of olive-oil.

SCALY LEG.—This condition is caused by another small parasite, rather similar to the ticks, but so small that it can only be seen with the microscope. They get under the scales, and multiply there, forming thick crusts, in which they breed. The legs become thick swollen and crusty, and the birds often go lame. Treatment consists of soaking the legs in washing soda dissolved in hot water. This softens the scales, and the crusts can be removed. The legs should then be dried, and a sulphur ointment rubbed in. The ointment is no use without the soda treatment first, as it cannot penetrate the crusts, and so does not reach the mites. Waste engine oil may be used instead of sulphur ointment.

MISCELLANEOUS.—Poultry are susceptible to a large number of conditions, which although not due to contagious disease, are none the less responsible for large numbers of deaths. The intestines are liable to become inflamed (enteritis) when the bird has been exposed to undue cold, damp surroundings, or irritant food. When the inflammation is severe, the birds often die. When mild, it is merely shown by a simple diarrhœa, which can be cured by putting a teaspoonful of powdered catechu in each gallon of drinking water. Permanganate of potash in the drinking water helps to avoid this condition. It also serves to indicate when the water is stale and unwholesome. Enough permanganate should be added to turn the water red. When it starts to become brown, it is time to change the water. On the other hand, the bird may become constipated, and require some epsom salts to make the bowels act freely again. It is advisable to give all poultry a dose of salts with the feed once a month, one tablespoonful dissolved in water, for every twelve birds. When a bird shows constipation, it should be dosed with a teaspoonful of salts dissolved in water. When the intestines are blocked up completely (impaction) sometimes salts will not be able to clear it, and the bird will die. Sometimes the crop is impacted. When this is caused by fairly soft material, the bird can be held upside down, and the contents gently squeezed out through the mouth. When the crop is impacted by a hard mass of tangled grass, etc., some olive-oil should be given and the crop then massaged frequently. If this fails it will be necessary for the crop to be cut open, washed out, and carefully sown up again.

Sometimes, after exposure to cold, especially in chicks, the birds get pneumonia (inflammation of the lungs). They then show a high temperature, with rapid breathing, and usually die in a short time. There is no treatment feasible. The reproductive organs, especially of heavily-laying hens, are liable to inflammation and obstruction. Where the egg cannot be passed, it is sometimes possible to remove it with a well-oiled finger, if the egg is near the opening of the vent. But when it is higher up, it is not possible to remove it, although if the hen is held over a bowl of steaming hot water, she is sometimes able to pass the egg without other assistance. Inflammation of the lining membrane of the body cavity (peritonitis) often follows diseases of the egg-forming organs, and then the bird almost invariably dies.

Abscesses not infrequently occur in poultry. The commonest site is on the foot. They are not uncommon on the breast, usually where birds are not provided with perches and have to sleep on the ground. Abscesses should be cut open with a clean sharp knife, and the cavity washed out with tincture of iodine. The pus is usually hard and cheesy, unlike the fluid pus found in mammals.

GENERAL REMARKS.—It will be seen from what has been said that the most vital precautions to be taken to keep poultry free from disease consist in scrupulous cleanliness and wholesome feeding, with plenty of green food whenever possible. Until the day dawns when every one who owns poultry pays proper attention to these matters, there will always be disease. Therefore, it is necessary for the careful poultry keeper to keep his birds separated from those of his less intelligent neighbours. As long as poultry are left to run about the streets with

all the other birds of the village, they will be liable to every disease that appears, however clean their own homes are. Therefore, all poultry should be kept in enclosed premises. All fresh birds that are bought to be added to the flock should be kept elsewhere for one or two months, in case they bring any disease in with them and infect the rest of the flock. If any of the birds thus isolated become ill, they should be removed at once. If the rest remain healthy, they can be added to the flock when the isolation period is over. Hen-houses should be swept up regularly, and the droppings disposed of. The inside of the houses should be thoroughly washed every six months with disinfectant, and all crevices filled up with gypsum. Roosting perches should not be attached to the walls, but should be kept quite away from them, and supported on legs standing in tins of water, which should be replenished daily. Thus the birds will be able to escape the attacks of ticks. Whenever the birds show evidence of lice, nicotine sulphate should be painted on the perch. The lice that drop off underneath the perch should be swept up and burnt, in case any of them are only stupefied instead of being killed.

When birds die, the carcases should either be buried or burnt. Failure to do this will spread the disease to neighbouring premises and from them it will in turn be passed back to one's own. Vaccination against poultry disease only gives protection for a short time. so it is not practicable to vaccinate poultry until a disease appears on one's premises or on those of neighbours. Vaccination never cures sick birds but prevents those that are still healthy from becoming infected, and therefore it must be done as early as possible. The Veterinary Service can only undertake to vaccinate poultry when the owners themselves do their share by keeping their poultry under healthy conditions. It is merely a waste of time and money to vaccinate birds that are left to mix again with diseased birds and feed on rubbish heaps infected with carcases, as these will become infected as soon as the effect of the vaccine has passed.

If poultry keepers observe the rules of cleanliness and correct feeding, and keep their birds away from all possible sources of disease, although a certain number of deaths cannot be avoided, they will be able to prevent heavy losses among their poultry.

Cotton Experiments.

BY A. M. FRANGOPOULOS, B.Sc. (AGRIC.).

THE Cotton Experiments started in 1930 and were repeated this year in the Central Experimental Farm, Morphou. It is hoped by these experiments to find suitable varieties of good quality cotton and to improve the cultural operations as a preliminary step towards the general improvement of the Cyprus Cotton Industry.

Although local varieties are believed to be good yielders, they are lacking in quality of lint and are not pure strains. Trials with better varieties of pure strains are being carried out by the Agricultural Department and it is hoped in a short time to be able to recommend those foreign varieties which during these experiments have exhibited better qualities than the local varieties.

These experiments comprise :—

(1) Date Experiments,
(2) Fertilizers Experiments,
(3) Spacing of plants experiments,
(4) Irrigation Trials, and
(5) Variety Trials.

The results of the 1935 experiments were as follows :—

(1) DATE EXPERIMENTS.

This experiment was arranged according to Fisher's Latin Square arrangement (five treatments and five replications), and the variety used was "Titsiros." The dates of sowing, 15th March, 29th March, 12th April, 26th April and 10th May, were randomized as follows :—

A.	D.	B.	C.	E.
C.	B.	E.	A.	D.
E.	A.	D.	B.	C.
D.	C.	A.	E.	B.
B.	E.	C.	D.	A.

A. Sown on 15th March.
B. Sown on 29th March.
C. Sown on 12th April.
D. Sown on 26th April.
E. Sown on 10th May.

The results obtained were as follows :—

Treatments.	Sown at.						
	15th March	29th March	12th April	26th April	10th May	Mean	Standard Error
Seed cotton per donum okes..	130.80	135.68	128.90	90.64	60.00	109.20	9.38
Seed cotton per cent. of mean okes	119.70	124.20	118.00	83.30	54.00	100.00	8.50

Yields obtained from cotton sown on 15th and 29th March and 12th April are significantly higher than the yields from cotton sown on 26th April and 10th May.

Similar results were obtained in previous years and it can now be safely recommended that irrigated cotton should be sown not later than the end of April.

The decrease in the yield obtained from late sowings is chiefly due to Pink and Spiny Boll worm attack. Experiments in other countries have also indicated that the higher yields are obtained from early sowings through their partly escaping Boll worm attack. Anything which tends to produce an earlier crop is of importance in reducing the loss caused by Boll worms.

Results in okes per donum obtained from Date experiments from 1930 to 1935 :—

Year	March	1st half April	2nd half April	1st half May	2nd half May	June
1930	209.00	167.50	176.00	161.00	132.00	110.00
1931	—	247.00	224.00	148.00	139.00	92.50
1932	189.18	184.00	170.00	155.00	139.00	75.00
1933		No Records.				
1934	93.74	83.33	80.33	50.83	—	—
1935	133.24	128.90	90.64	60.00	—	—
Total ..	625.16	810.75	740.97	574.83	410.00	277.50
Mean ..	156.29	162.14	148.19	114.96	136.16	92.50

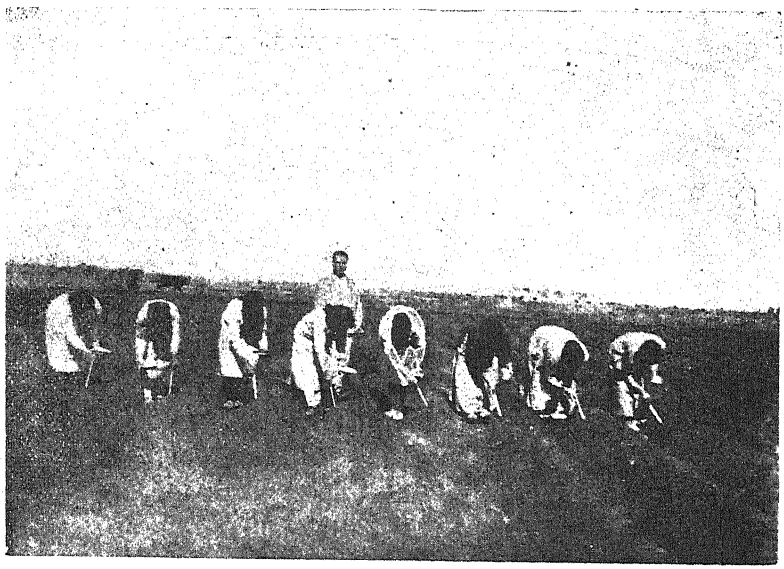


FIG. 1. *Cotton Sowing.*—The land was ploughed twice, clods crushed, and then ridged. The stick is used for making the holes in which the seed is placed and for the measurement of the distance between holes.

FIG. 2. *Irrigation of Cotton. Ridges after Sowing.*—Special care should be taken for the water to reach the seed to insure a good stand.

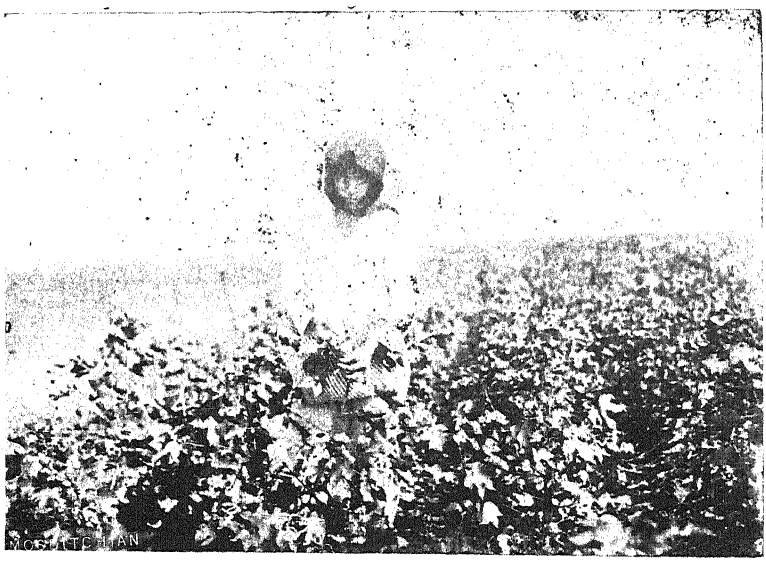


FIG. 3. *Picking of Cotton.*—The boll is not cut from the plant and special care is taken not to mix dry leaves with the cotton.

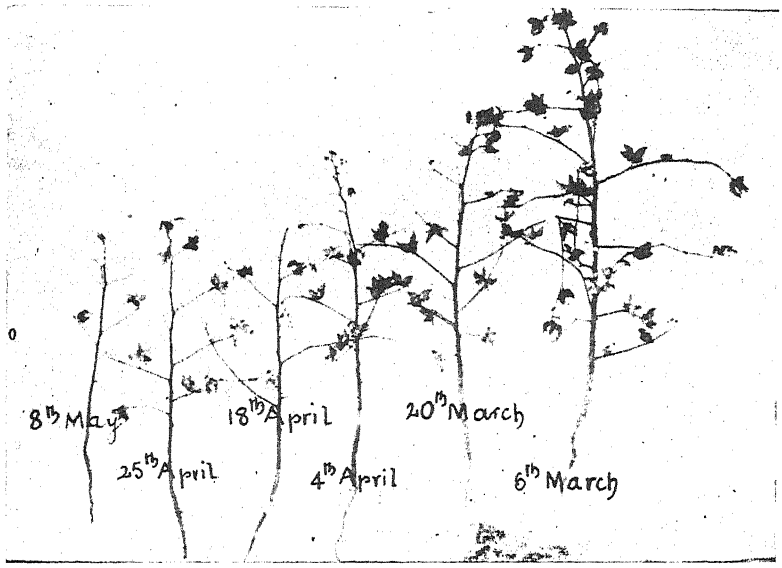


FIG. 4.—Cotton plants which were specially defoliated to show the difference in number of bolls between plants sown at different dates.

(2) FERTILIZERS EXPERIMENTS.

Four treatments (three types of fertilizers and one control) and four replications were also randomized according to the Latin Square arrangement. The types used were :—

4 units nitrogen, 10 potash, known in the market as 4 : 0 : 10.
4 units nitrogen, 10 phosphoric acid, 10 potash, known as 4 : 10 : 10.
4 units nitrogen, 10 phosphoric acid, known as 4 : 10 : 0.

The following results were obtained :—

Treatments	4 : 0 : 10	4 : 10 : 10	Control	4 : 10 : 0	Mean	Standard Error
Seed Cotton, per donum, okes..	124.00	116.00	117.00	115.50	118.12	2.61
Seed Cotton, per cent., okes ..	105.00	98.20	99.00	97.80	100.00	2.21

No significant differences were obtained between treatments or between any treatment and control due, perhaps, to the quantity of fertilizer per donum being small.

(3) SPACING EXPERIMENTS.

Four different spacings between plants were compared (13 inches, 18 inches, 10 inches and 16 inches) but no appreciable differences in yield were obtained.

(4) IRRIGATION TRIALS.

Two sets of four plots, each having an area of half a donum, were planted in equal parts with "Titsiros" and "Mesowhite." All plots were sown in April and received three irrigations up to the 26th June, 1935. The quantity of water for these irrigations was not measured owing to the non-completion of the special irrigation tanks. After that date, irrigations were given as follows :—

First Set of Plots.

a "Titsiros" } Irrigated every 15 days up to the middle of
a "Mesowhite" } September, at the rate of 15,000 gallons per donum.

b "Titsiros" } Irrigated every 15 days up to the middle of
b "Mesowhite" } September, at the rate of 20,000 gallons per donum.

c "Titsiros" } Irrigated every 15 days up to the middle of
c "Mesowhite" } September, at the rate of 30,000 gallons per donum.

d "Titsiros" } Irrigated every 15 days up to the middle of
d "Mesowhite" } September, at the rate of 40,000 gallons per donum.

The results obtained were as follows :—

a "Titsiros"	.. .. ..	122 okes per donum.
b do.	.. .. ..	116 do.
c do.	.. .. ..	114 do.
d do.	.. .. ..	96 do.
a "Mesowhite"	.. .. ..	100 do.
b do.	.. .. ..	119 do.
c do.	.. .. ..	104 do.
d do.	.. .. ..	149 do.

Second Set of Plots.

A. "Titsiros" } 30,000 gallons per donum every 12 days.
A. "Mesowhite" }

B. "Titsiros" } 30,000 gallons per donum every 15 days.
B. "Mesowhite" }

C. "Titsiros" } 30,000 gallons per donum every 18 days.
C. "Mesowhite" }

D. "Titsiros" } 30,000 gallons per donum every 21 days.
D. "Mesowhite" }

The following results were obtained :—

A. "Titsiros	.. .. ..	124 okes per donum.
B. do.	.. .. ..	114 do.
C. do.	.. .. ..	128 do.
D. do.	.. .. ..	119 do.
A. "Mesowhite"	.. .. ..	105 do.
B. do.	.. .. ..	119 do.
C. do.	.. .. ..	118 do.
D. do.	.. .. ..	114 do.

No importance can be attached to these results as measurements of the quantities of water started late in the season and replications were not enough to permit statistical reduction of the results.

(5) VARIETY TRIALS.

The following varieties were grown side by side in plots of about two donums each and the following results were obtained :—

Variety	*Yield per donum*	*Ginning output*
		per cent.
" Mesowhite "	93.69	28.50
" Giza II "	81.19	34.18
" Sakha IV "	62.01	32.04
" U. 4 "	83.25	29.63
" Giza VII "	68.18	32.66
" Sakha II "	76.73	32.14
" Sakelaridis "	43.16	32.54
" Cyprus Select "	79.48	27.16
" Nahda "	52.76	33.11
" Giza III "	59.27	31.79

Of the foreign varieties " Mesowhite " again gave the highest yield. The Egyptian varieties were superior to the local " Mesowhite," " U. 4 " and " Cyprus Select " in ginning output.

ADVICE TO COTTON GROWERS.

(1) Sow irrigated cotton not later than the end of April ; give at least six irrigations up to the beginning of September at intervals of fifteen days and hoe after the first, second and third irrigations at least.

(2) When sowing dry (unsoaked) seed and on dry land use eight to ten seeds per hole to insure a better stand. Always sow irrigated cotton on the side of the ridge making long ridges in well-levelled land short ones on more uneven land.

(3) When sowing dry cotton do not wait for the late rain which usually comes in May ; sow, if possible in April, any subsequent rain will do good to the young plants and will not harm them as is generally believed.

(4) Hoe dry cotton as regularly as possible, as much of the soil moisture is lost through weeds growing in the cotton field.

(5) Pick cotton directly from the plant and do not cut the bolls.

Vine Budding.

BY P. ANTONIADES, *Viticulturist and Wine Expert.*

VINE budding during the period of active growth has never hitherto been practised in Cyprus in the same way as budding is practised with apples and other fruit trees.

Demonstrations of vine budding were arranged last year in a number of vine-growing villages of Limassol and Paphos Districts. The demonstrations were successful and practically no failures occurred, while by the cleft grafting method (which is the method usually employed in Cyprus in propagating selected grape varieties), failures are as high as 50%.

The reason why the difference in the proportion of failures is so great is due to the fact that with budding no treatment or after care is required, while with cleft grafting the vines require special treatment during the post-grafting period.

Vine budding is easily done. It is carried out when the eye is fully developed and while the shoot is still green and the bark easily detached.

The bud produces a strong shoot during the same summer, which can bear fruit in the following year and sometimes during the same summer.

The best time for vine budding is the end of May and beginning of June. If budding is done late in the season when the eye or bud is dormant, it will not produce any shoot until the following spring.

Budding is carried out in the following manner :—

The vine shoot selected for budding is cut horizontally. An incision is then made below the eyes in the shape of a T (single) or I (double) so that the two sides of the incision can be opened to expose the cambium. The bud is inserted below the bark next to the cambium and held in position firmly by tying with raffia.

The bud is prepared by making two transverse incisions half-an-inch above and half-an-inch below an eye, and a verticle cut is then made to unite the two transverse incisions so that the bud may be easily detached.

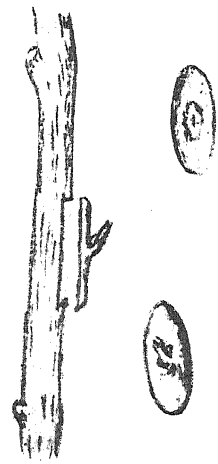
All vine growers are recommended to try vine budding especially on trellised vines and young vines from 2 to 4-years-old. It is not recommended for old vineyards as it would mean the formation of a new head, higher than the head already formed by local pruning and if the old head was cut away, a large wound might result, endangering the vine.

If it is desired to carry out budding on old vineyards it is recommended that the shoots below the head be budded. If the budding is a success the whole of the old vine above the budded shoot may be removed and the vine is regenerated without loss of crop during the year of budding.

The only disadvantage in budding is the risk in transporting buds when suitable budwood is not available close at hand.

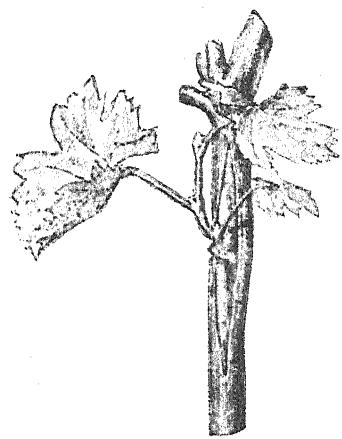
DIAGRAMS OF VINE BUDDING.

1.—Incision on vine shoot selected for budding.



2.—Budwood.

3.—Inserted bud tied with raffia.



4.—Growth after successful budding.

Publications Reviewed.

VERNALIZATION AND PHASIC DEVELOPMENT OF PLANTS.

(*Bulletin No. 17 of the Imperial Bureau of Plant Genetics*).

VERNALIZATION is a subject which has intrigued agriculturists in all parts of the world since it came to prominent notice in recent years and the production of a new Bulletin which embodies an exhaustive study of this subject in its widest aspect is a welcome addition to agricultural literature.

The theory and general principles of vernalization are roughly that plant growth and development are two distinct and separate phenomena. By growth is meant increase in size of the plant and development includes flowering and reproduction. Either of these processes may proceed independently of the other and according to the new theory the plant may be treated in such a way so that the one may proceed to the exclusion of the other.

The technique of vernalization is the special treatment of seed before sowing under suitable conditions of light, temperature, humidity and other factors to obtain accelerated development and when the vernalized seed is sown in the ordinary way accelerated development results and the crop ripens earlier.

Early ripening of certain crops is an important factor and if the application of vernalization may be regarded as a practical agricultural measure, it will be of considerable economic importance in its application in such countries where climatic conditions limit the period of growth or in the case of such crops where the difference of a few days in placing the product on the market is of vital importance. There is some doubt as to whether vernalized sowings give an increased or decreased yield.

Vernalization is the Latinized equivalent of a Russian word which means "transformation of winter forms into spring." T. D. Lysenko, who headed the Odessa school of plant physiologists, originally brought the idea of vernalization to prominence.

The new Bulletin is issued jointly by the Imperial Bureaux of Plant Genetics, Aberystwyth and Cambridge, and it constitutes a clear indication of the manner how the Imperial Agricultural Bureaux make available information on subjects of scientific research which normally do not come to notice unless the agricultural research worker has access to and is able to make use of the agricultural literature of the particular country from where reports of the original research work have emanated.

The contents of I.A.B. Bulletin No. 17 comprise a foreword by Sir David Chadwick, a comprehensive study of the research in the Soviet Union on vernalization and notes on results on work on vernalization in countries other than the Soviet Union.

The Bulletin deals with the available information on this controversial subject from all possible points of view and the publication should be of special interest to the Empire agriculturist who wishes to be *au fait* with the possibilities of this new trend in agricultural research.

A. P.

Live-stock Notes.

THE photograph published at the frontispiece of this issue is of the Dairy Shorthorn Bull "Ilford Ambassador" the 5th imported from England in December, 1935.

The Manager, Government Stock Farm, Athalassa, reports that Cow No. 321 shown below (Fig. 1) has completed her third lactation. She is a crossbred cow (Dam. Shorthorn : Sire Friesian) and was born on the 19th October, 1930. She calved her first calf on 12th May, 1933. In her first lactation she gave 6,494 lbs. of milk in 313 days. In her second lactation she gave 8,774 lbs. of milk in 264 days. She calved for the third time on the 3rd May, 1935, and has given 11,618 lbs. of milk in 297 days. This is equivalent to 4,150 okes or 14 okes per day. The butter fat content in this lactation averaged 3.55% which is equivalent to a yield of 412½ lbs. of butter (147 okes) or nearly 10 lbs. (3½ okes) of butter per week. This yield is believed to be a record for Cyprus.

Figures 2 and 3 show ewes being fed and milked in the specially-constructed milking stands used at Athalassa.

The ewes soon become accustomed to them and learn to run up the sloping platform of their own accord. After milking is completed the door on which the food box is attached is swung open and the ewe runs down the other platform.

Reference was made to this method of milking in an article on "The Breeding and Management of Sheep in Cyprus" which was published in the *Cyprus Agricultural Journal*, Vol. XXX, December, 1935.

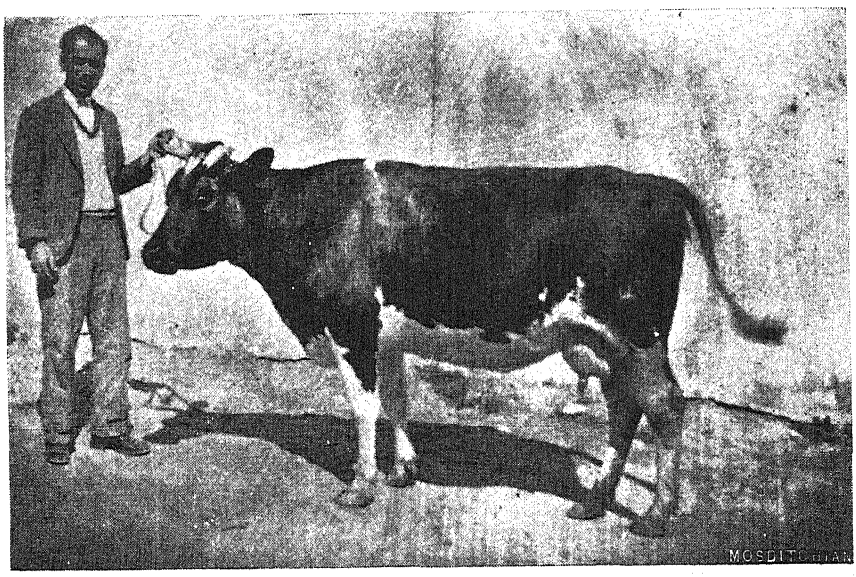


FIG. 1.—Dam. Shorthorn : Sire Friesian, a Crossbred Cow.

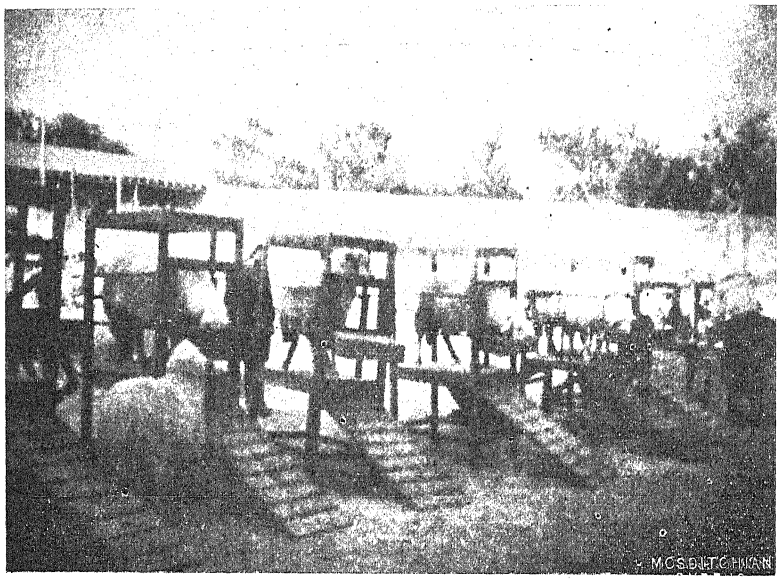


FIG. 2.—Ewes fed at Athalassa.

FIG. 3.—Ewes being milked in specially-constructed Milking Stands.

The Horse Breeding Law, 1930.

LIST OF STALLIONS LICENSED FOR 1936.

NICOSIA DISTRICT.

Village	*Owner's name*	*Reg. No.*
Akaki ..	Michael Th. Rafti ..	29
do. ..	Elias M. Tsinga ..	203
Argaki ..	Polyvios Theophani ..	153
Astromeritis ..	Christoforos Evangeli ..	26
Elea ..	Rejeb Ahmed ..	254
Kalokhorio ..	Yioryis Papaconstantinou ..	262
Lefka ..	Yiangos G. Boyiadji ..	20
Lymbia ..	Andronikos Petri ..	32
do. ..	Kyr. Constantinou ..	33
Mammari ..	Sotiris Ioannou ..	206
Morphou ..	Vasilis T. Spanos ..	18
do. ..	Andreas Ahapittas ..	249
Nicosia ..	Haji Costas Haji Panayi ..	62
Philia ..	Towlis Haralambou ..	255
Yeri ..	Yeoryos Petri ..	16
Yerolakkos ..	Haralambos Sophokli ..	194

LARNACA DISTRICT.

Alaminos ..	Salih Jumaa ..	64
Aradhippou ..	Costis Kyriakou ..	15
do. ..	Lefteris Towli ..	225
do. ..	Gregoris Sava ..	261
Athienou ..	Yiangos N. Kalapodha ..	22
do. ..	Haris Antoni ..	66
do. ..	Costas N. Haji Vrashimi ..	96
do. ..	Vasilis M. Phiakou ..	159
Kophinou ..	Hussein Handji Ibrahim ..	209
Voroklini ..	Panayis Theodosi ..	106
do. ..	Haral. A. Chapoulis ..	220

FAMAGUSTA DISTRICT.

Angastina ..	Gavriel G. Kamenou ..	260
Asha ..	Antonis Michael ..	92
do. ..	Demetris Kounallis ..	208
do. ..	Christos Haji Lavithi ..	234
do. ..	Kyriakos Antoni ..	239
Ayios Andronikos ..	Spyros Yeoryi ..	65
do. ..	Christofis Hambi ..	240
Ayios Elias ..	Constantis Stylli ..	246
do. ..	Therapos Haji Michael ..	256
Ayios Seryios ..	Antonis S. Gizas ..	68
Ephtakomi ..	Loizos Hambaka ..	219
Famagusta ..	Ibrahim Mehmet Kallika ..	211
Galatia ..	Akil Mustafa Gonie ..	54
Komi Kebir ..	Kyriakos Antoniou ..	48
Kondea ..	Theocharis Alexandrou ..	193
do. ..	Christos Hanni ..	259
Kouklia ..	Mehmed H. Kokkinos ..	215
Lefkoniko ..	Mehmed Salih ..	38

Village	*Owner's name*	*Reg. No.*
Lefkoniko ..	Christos Haji Symeou ..	41
Leonarisso ..	Chrysanthos Panayi ..	56
Lysi ..	Minas Lysandrou ..	80
do. ..	Artemis Haji Constandoura ..	227
Marathovouno ..	Loukas Poutsaras ..	43
Melanagra ..	Kallis Kyriakou ..	60
Milea ..	Panayis Michael Pavli ..	247
do. ..	Loizos Panayi ..	257
Ovgoros ..	Djafer Emin A. M. Mustafa ..	213
Paralimni ..	Andreas K. Xiouri ..	72
do. ..	Evangelis Haji Vraka ..	172
do. ..	Evangelis Haji Vraka ..	245
do. ..	Nicolas G. Tsiakouras ..	210
do. ..	Demetris A. Maouris ..	244
do. ..	Avraamis Anastasi ..	258
Peristeronopiyi ..	Andreas Louka ..	45
do. ..	Const. K. Haji Yeoryi ..	73
Phrenaros ..	Kyriakos Theori ..	71
do. ..	Adamos Haji Theori ..	226
Rizokarpaso ..	Panayiotis K. Sakka ..	171
do. ..	Christofis N. Koulia ..	241
do. ..	Nicolas Chr. Barbotta ..	251
Sotira ..	Vasilis Demetri ..	252
Trikomo ..	Marikou Kyriakou ..	224
do. ..	Christos Demetri ..	101
Vatili ..	Andreas G. Iona ..	86
do. ..	Yeoryis T. Haji Fisendzou ..	88
do. ..	Vasiliki Haji Christodoulou ..	89
	LIMASSOL DISTRICT.	
Anoyira ..	Thoukis Solomi ..	143
Asgata ..	Demosth. Evangeli ..	119
Ay. Amvrosios ..	Panayis Michael ..	223
Ay. Phyla ..	Costis P. Silikiotis ..	118
Episkopi ..	Bairam Mehmed ..	131
Erimi ..	Stephanos Apostoli ..	144
Pakhna ..	Theodoros Evgeniou ..	121
Limassol ..	Mehmed Mustafa ..	40
Mesayitonia ..	Demetris Karkallis ..	117
	PAPHOS DISTRICT.	
Amarketi ..	Mulla A. M. Mustafa ..	125
Dhrousa ..	Yiannis Sava ..	139
Kissonerga ..	Evangelis Haji Nicola ..	126
do. ..	Haji Towlis Haralambou ..	129
Ktima ..	Veli Tselebis ..	127
Lapithiou ..	Mehmed Mulla Osman ..	263
Lasa ..	Yeoryios Ch. Ellinas ..	130
Pano Arodhes ..	Harilaos Nicolaou ..	136
do. ..	Chrysost. Panayiotou ..	214
Phasli ..	Hassan Tahir ..	228
Prodromi ..	Avraamis Sava ..	248

Village	*Owner's name*	*Reg. No.*
Steni ..	Costis Pelekanides ..	230
Stroumbi ..	Sofoklis Constanti ..	178
Terra ..	Mustafa Yusuf ..	141
	KYRENIA DISTRICT.	
Agridhaki ..	Haralambos Yianni ..	147
Asomatos ..	Christallou Michaeli ..	146
do. ..	Antonis Haji I. Hanni ..	150
Ayios Ermolaos ..	Efstathios Christofi ..	166
Ayios Yeoryios ..	Costis N. Spanou ..	157
Bellapais ..	Savas K. D. Jirkaji ..	161
do. ..	Savas K. Demetriades ..	236
Dhiorios ..	Gregoris Haji Michael ..	148
Kyrenia ..	Shakir Hussein ..	158
Lapithos ..	Polyk. Panayioti ..	99
do. ..	Artemis H. Proestos ..	156
Larnaka tis Lapithou	Ioannis Costi ..	152
Myrtou ..	Cleov. Stylianou ..	149
Sisklipos ..	Lavithis Demetriou ..	232

17*th March*, 1936.

ROBERT J. ROE,
Chief Veterinary Officer,
Inspector of Horse Breeding.

Meteorological Data, Cyprus.

SUMMARY OF OBSERVATIONS AT REPRESENTATIVE STATIONS.
DECEMBER, 1935.

District and Station	Shade temperature		Rainfall				
	Mean		Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
	Maxim.	Minim.					
Nicosia District:							
Nicosia	65.61	46.26	0.88	10	0.42	2.58	—
Athalassa	—	—	0.55	5	0.40	2.40	—
Morphou	—	—	—	—	—	2.24	—
Makhæras	—	—	2.00	2	1.65	4.65	—
Famagusta District:							
Famagusta	69.45	48.29	2.24	10	0.82	3.77	—
Akhyritou	66.00	46.20	1.38	7	0.55	2.96	—
Rizokarpaso ...	—	—	3.14	9	0.95	5.30	—
Lefkoniko	—	—	0.63	7	0.17	3.10	—
Larnaca District:							
Larnaca	67.00	49.00	1.25	9	0.38	5.16	—
Lefkara	—	—	2.22	7	0.65	5.31	—
Limassol District:							
Limassol	67.90	50.77	1.55	11	0.50	4.37	—
Saittas	—	—	2.43	8	0.62	2.92	—
Trikoukkia... ...	—	—	—	—	—	6.58	—
Alekhtora	—	—	3.53	8	1.86	4.95	—
Paphos District:							
Paphos	—	—	2.10	14	0.40	4.39	—
Polis...	—	—	2.67	8	1.25	3.61	—
Kyrenia District:							
Kyrenia	66.25	54.20	2.04	13	0.51	4.96	—

Note.—Compiled from returns furnished by Public Works Department.

JANUARY, 1936.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall Total inches	Rainfall No. of days rain	Rainfall Greatest fall in one day	Rainfall Average for 10 years inches	Rainfall Dates on which snow fell
Nicosia District:							
Nicosia	64.00	44.37	1.22	6	0.90	3.30	—
Athalassa	—	—	0.85	4	0.73	3.07	—
Morphou	67.65	44.26	1.15	7	0.44	2.80	—
Makhæras	—	—	3.10	3	2.10	5.34	—
Famagusta District:							
Famagusta	67.36	46.06	4.90	8	1.45	4.12	—
Akhyritou	64.00	44.00	2.86	9	0.74	2.91	—
Rizokarpaso ...	—	—	9.37	8	5.67	5.65	—
Lefkoniko	—	—	0.92	4	0.50	3.22	—
Larnaca District:							
Larnaca	66.00	46.00	3.07	10	1.60	5.13	—
Lefkara	—	—	3.76	7	1.76	4.30	—
Limassol District:							
Limassol	65.55	46.94	3.55	11	2.37	3.89	—
Saittas	—	—	3.37	6	1.45	5.62	—
Trikoukkia	44.74	36.00	2.81	5	1.25	5.78	—
Alekhtora	—	—	3.24	8	1.58	4.05	—
Paphos District:							
Paphos	—	—	3.55	11	0.60	3.98	—
Polis...	—	—	1.43	6	0.45	3.34	—
Kyrenia District:							
Kyrenia	64.11	50.10	2.17	12	0.69	4.57	—

FEBRUARY 1936.

Nicosia District:							
Nicosia	62.00	44.07	1.95	14	0.54	2.87	—
Athalassa	—	—	1.57	7	0.84	2.58	—
Morphou	73.48	43.83	3.13	14	0.78	2.88	—
Makhæras	—	—	6.58	6	3.20	5.54	—
Famagusta District:							
Famagusta	65.86	44.10	1.88	10	0.59	3.39	—
Akhyritou	62.30	42.50	1.82	9	0.61	2.52	—
Rizokarpaso ...	—	—	2.62	7	0.70	4.37	—
Lefkoniko	—	—	1.99	10	0.71	2.76	—
Larnaca District:							
Larnaca	64.00	44.00	2.14	12	0.94	3.79	—
Lefkara	—	—	2.46	9	0.85	4.27	—
Limassol District:							
Limassol	64.41	45.45	3.26	14	0.60	3.48	—
Saittas	—	—	6.82	11	2.50	6.28	—
Trikoukkia	45.13	33.10	8.80	9	1.45	6.94	—
Alekhtora	—	—	4.01	9	0.74	4.48	—
Paphos District:							
Paphos	—	—	4.22	11	1.20	4.58	—
Polis...	—	—	4.29	10	1.10	4.08	—
Kyrenia District:							
Kyrenia	62.26	49.23	5.68	15	1.15	5.52	—

Note.—Compiled from returns furnished by Public Works Department.

EDITORIAL AND ADVERTISEMENT NOTICES

All communications for publication should be addressed to the Editor, *Cyprus Agricultural Journal*, Department of Agriculture, Nicosia.

Contributions are invited, written on one side of the paper only. It should be understood that unaccepted manuscripts can not be returned unless postage is prepaid.

Copies of the *Cyprus Agricultural Journal* can be obtained on application to the Department of Agriculture, price 3*cp.* per number, or by post 4*cp.*

Annual subscription payable in advance 16*cp.* post free. Overseas subscription 18*cp.* (2/-).

SCALE OF ADVERTISEMENT CHARGES.

A special reduced rate is charged for all advertisements inserted. As the Journal is circulated throughout the Colony and copies are sent to all Colonies Overseas it may be regarded as a valuable medium for advertising.

The following are the rates in force :—

COVER—Full page, 1 year or 4 insertions ...	£2	0	0
INSIDE PAGES—Full page, 1 year or 4 insertions	1	12	0
,, Half page ,,	–	16	0
,, Quarter page ,,	–	8	0

For one insertion only, one-fourth of above charges.

All charges payable in advance.

PRIVATE ADVERTISEMENTS.

For Wants, Articles for Sale or Exchange, Notices of Meetings, Events, etc., for the first 16 words, 2*s.* Exceeding 16 words but not exceeding 32 words, 4*s.* For every additional 8 words 6*cp.*

Advertisements should be written on one side of the paper only and should reach the Editor, *Cyprus Agricultural Journal*, not later than the 10th of the month of issue.

The "Cyprus Agricultural Journal" is published in March, June, September and December.

The Editor does not necessarily endorse the statements or opinions expressed in contributed articles, the responsibility for which rests with the authors.

Table Showing Distribution of Stud Animals at the Stud Stables and Government Stock Farm, Athalassa on 1st April, 1936.

Station	*Stallion*	*Jack Donkey*	*Bull*	*Breed*
—	—	—	—	—
Athalassa ..	Corby Bridge ..	No. 42 (Spanish) ..	No. 480 (Ambassador) ..	Shorthorn
	Moleskin ..	No. 38 ..	No. 462 ..	Crossbred
	Mazarin ..	— ..	No. 456 ..	Kerry
	—	—	No. 469 ..	Cyprus
Ay. Theodoros	Pitchford ..	No. 50 ..	No. 461 ..	Cyprus
Famagusta ..	Friars Flutter ..	No. 51 ..	No. 443 ..	Cyprus
Larnaca ..	Lifeline ..	No. 52 ..	No. 455 ..	Crossbred
Lefkoniko ..	Marcher Lord ..	No. 54 ..	No. 468 ..	Cyprus
Limassol ..	Canterbury ..	— ..	— ..	—
Morphou ..	— ..	No. 47 ..	— ..	—
Nicosia ..	— ..	— ..	No. 450 ..	Crossbred
Paphos ..	Llwynog's Model	No. 41 ..	No. 454 ..	Kerry
			No. 459 ..	Cyprus
Polis ..	do. ..	No. 49 ..	No. 451 ..	Kerry
Rizokarpaso ..	— ..	No. 45 ..	No. 460 ..	Cyprus
Vatili ..	Waterkoscie ..	No. 48 ..	No. 458 ..	Cyprus

Notes: 1.—There are also Boars at all the above stations except Nicosia, Morphou and Limassol and there are he-goats at all stations except Morphou and Limassol.

2.—The Stallion at Limassol will travel to Evdhimou and back, that at Ayios Theodoros will travel to Rizokarpaso and back and that at Paphos to Polis and back, every month.

3.—Boars and he-goats may be issued on loan to *bona fide* applicants upon application to the Director of Agriculture or Manager Stock Farm, Athalassa.

The Cyprus Agricultural Journal

A QUARTERLY REVIEW

OF THE

AGRICULTURE, FORESTRY AND TRADE OF CYPRUS

Vol. XXXI, Part 2 JUNE, 1936 Price 3cp.

EDITORIAL NOTES.

Agricultural Situation.

The outstanding feature affecting the agricultural situation and outlook during the past quarter has been the heavy and continuous rains during May and the exceptionally cool weather in the early part of June.

The rain for May is well above the average over an extended period of years for practically all parts of the Island and this unseasonal weather has had a disturbing effect on the agriculture of the Island. Considerable damage was caused to harvested cereals on the threshing floor and to sheaves lying in the fields and standing cereals were badly damaged by rust. The variations in temperature are likely to affect next season's olive and citrus crops owing to the adverse effect at the time of flowering. Cherries and other stone fruits suffered from the excess of rains and the almond crop is poor. On the other hand all summer crops will benefit and the production of apples will be good.

The prices for cereals reacted to the climatic conditions and the price of wheat soared to 5*s*. per kilé but it is expected the price will drop when the delayed threshing continues and ample supplies of local grain come on to the market.

* * * * * * *

Shipping Services for Citrus Fruits.

The following resolution was passed at a meeting of the Cyprus Shippers' Association held on the 25th April, 1936 :—

> "This Council considers that conditions of shipment of citrus fruit are not likely to be improved unless all Shippers of such fruit are prepared to join together to deal as a whole with Shipping Companies and to guarantee quantities for shipment. It, therefore, recommends that all shippers of oranges be called upon to join an Association of Orange Shippers, which should be a section of the Association for the purpose of securing better shipping service."

A Sub-Committee consisting of the Director of Agriculture, Comptroller of Customs and Inland Revenue and Mr. Zenon Pierides was appointed to deal with the proposal and on the 17th May a meeting was held at Famagusta which all exporters of citrus fruits were invited to attend. As a result of the Famagusta meeting a Committee was elected consisting of Messrs. Ioannis Ioannou, Prodromos Papadopoulos and Ioannis G. Marangos for drawing up the Rules of the proposed Association of Orange Shippers for consideration by the Cyprus Shippers Association.

* * * * * * *

INSPECTION OF ONIONS FOR EXPORT.

Regulations under the Agricultural Produce (Export) Law, 1933, providing for the inspection of onions before export are likely to be introduced at an early date. These regulations are based on the Agricultural Produce (Potato) Export Regulations, 1935, now in force.

* * * * * * *

RURAL EXTENSION EDUCATION.

Mr. B. J. Weston, Superintendent of Agriculture, left Cyprus on the 9th June, 1936, on vacation and duty leave. Mr. Weston will visit Macedonia for a short period to study the development made in Rural Extension Education there which the Near East Foundation have conducted for some years.

* * * * * * *

DEVELOPMENT OF TRADE WITH PALESTINE AND EGYPT.

Mr. G. M. Pietroni, the Trade Development Officer, represented Cyprus at the Levant Fair at Tel-Aviv early in May. Mr. Pietroni returned to Cyprus *via* Egypt where he made investigations on the marketing of Cyprus products in Egypt. Various travel agencies were also visited with a view to stimulate further interest in Egypt to the advantages of Cyprus as a tourist and holiday resort.

* * * * * * *

AGRICULTURAL SHOWS.

An Agricultural, Animal and Industrial Show was held at Larnaca on the 31st May, 1936, on the occasion of the "Kataklysmos" festival.

The new Municipal Market was opened by His Excellency the Governor during the period of the Show and Fair and these events attracted a considerable number of visitors to Larnaca.

Forthcoming Shows during the year are:—

8th September, 1936, Lysi Agricultural and Animal Show.

4th, 5th and 6th October, 1936, Paphos District Agricultural Show to be held at Ktima.

Proposals are also under consideration to hold Shows at Kyrenia, Morphou and Limassol, but the dates have not yet been fixed. The Larnaca Poultry Show will be held during December, 1936, and proposals are under consideration for village fruit and vegetable shows at Kiti, Pervolia and Agros during the Autumn.

AWARD OF PRIZES TO SCHOOL GARDENS FOR THE SCHOOL YEAR 1935-36

The Colony prize for the best School Garden for the School Year was awarded to Anoyira School. Mr. Antonis Kontoyannis is the Schoolmaster who was in charge of the School during the year.

District and Area prizes were awarded for the best two gardens as follows :—

District or Area	*School*	*Schoolmaster*
Nicosia	Yerolakkos	M. Mavromatis and others.
,,	Peristerona	E. Sotiriou.
Lefka	Evrykhou	I. Myrianthousis.
Larnaca	Agros	M. Haji Georghiou and others.
,,	Pera Khorion	Chr. Christodoulides.
Famagusta	Yialousa	Iacovos Iacovides and others.
,,	Ayios Nicolaos	G. Avraam.
Paphos	Ayios Therapon	S. Stylianides.
,,	Yeroskipos	A. Dinglis and others.
Kyrenia	Myrtou	N. Zembilas.
Trikoukkia	Phini	H. Pantelis.

* * * * * * *

LOCUST CAMPAIGN.

The first centres for the purchase of locusts were opened on 30th March and the last centres were closed on 23rd May. For part or the whole of this period centres were open at twelve villages. The total quantity of locusts destroyed was 24,746 okes, compared with 3,774 okes last year and 162,219 okes in 1927.

The occurrence of the Moroccan locust, known as the " true locust " was considerably greater than last year, and the occurrence of the Italian locust, known as " tsakracrida," was very much greater, and several species of grasshoppers were also very abundant.

* * * * * * *

BULLETIN OF THE IMPERIAL INSTITUTE.

With effect from the January-March, 1936, issue of the Bulletin of the Imperial Institute this publication will be published by the Imperial Institute itself. The general format of the Bulletin remains unchanged but some improvements in the scope of the Bulletin have been effected with a view to appealing to a wider circle of readers. More space will be devoted to the various aspects of the work of the Institute which will include the results of the more important laboratory investigations, articles and notes on plant and animal products and a record of developments in the Public Exhibition Galleries and Cinema of the Institute. An important feature will be the section on subjects of mineral interest. The price has been reduced to 2*s.* 6*d.* per number, by post 2*s.* 9*d.* (annual subscription 10*s.* post free).

SERICULTURAL NOTES.

Production of Silk Coccoons.

Generally the rearing of silkworms seems to have been satisfactory. Although the weather during the last days of rising in some areas was rainy and wet, still owing to precautions taken by the rearers as instructed by the travelling agricultural officers the damage owing to diseases, and especially to Flasherie and Grasserie which are favoured by damp weather, was very little.

In many places lack of mulberry leaves was experienced and rearers, some of whom had uprooted a good number of mulberry trees, were obliged to buy leaves at 1–1½*cp.* per oke to feed their silkworms. On account of the depressed prices of the cocoons at present this system does not pay and rearers are advised to hatch out only such a quantity of silkworm eggs as they can be sure of feeding with their own mulberry leaves.

New cocoons appeared in the market after the 10th May and were purchased by merchants at 1*s.* per oke. Owing to the low prices a very small quantity will be offered to the market, the larger quantity being reeled for domestic use.

The total production of cocoons in Cyprus this year is estimated at 100,000 okes approximately.

* * * * * * *

Demonstrational Silkworm Rearing in Girls' Schools.

Demonstrational silkworm rearings have been carried out in 144 girls' schools in various parts of the Island, and the schoolmistresses and schoolgirls engaged in the feeding and care of the worms, and the girls followed the various stages from the hatching of the silkworm eggs to the production of the cocoons.

Many rearers visited the demonstrational rearings in their villages and saw the improved methods of hatching and rearing the worms.

Cocoons produced from these rearings are much better in quality than those produced by the old methods and many persons who were trained in these improved methods while at school now follow these methods in their own rearings.

* * * * * * *

Statement showing the number of mulberry trees 3 years old and over, in each District for the last five years.

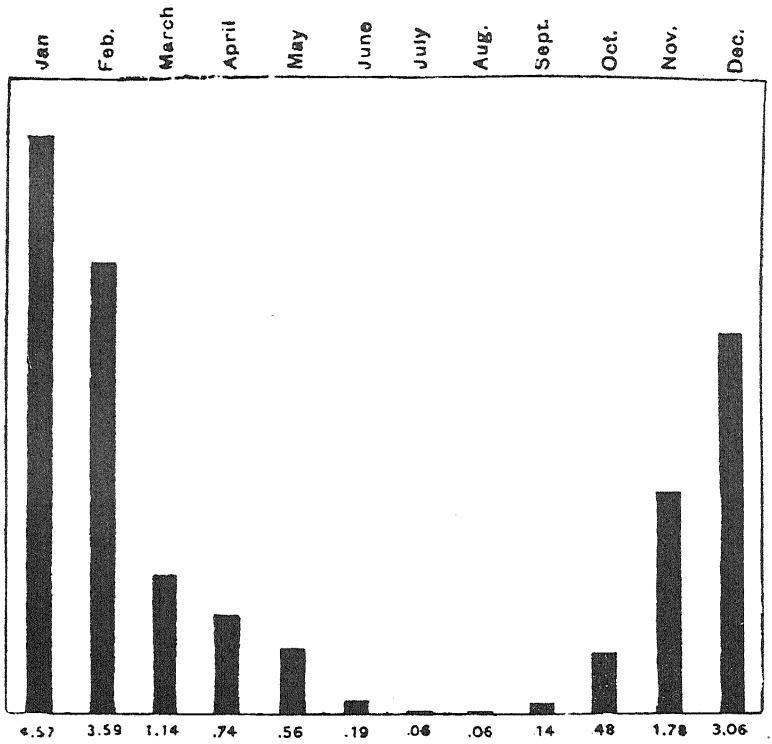
District	1931	1932	1933	1934	1935
Nicosia	76,815	85,014	89,986	92,450	97,166
Larnaca	30,343	40,120	45,161	49,687	53,802
Limassol	33,512	37,047	38,890	43,528	45,143
Famagusta	120,930	123,991	125,984	127,373	126,092
Paphos	82,615	87,297	88,353	85,779	82,978
Kyrenia	128,425	127,616	124,576	117,565	115,105
Total	472,640	501,085	513,890	516,382	520,286

Irrigation in Cyprus.

BY A. PITCAIRN, *Assistant Director of Agriculture.*

INTRODUCTION.

IRRIGATION is of considerable economic importance to Cyprus and the growing of crops by irrigation has been practised in the Island since ancient times. In the coastal and central plain areas the climate is arid in character and the average monthly rainfall of these areas for a period of ten years, which is illustrated below shows that the rainfall is distributed over the winter months with practically no rain during the hot summer months.



Average Monthly Rainfall in inches – Coastal & Central Plain

10 Years 1925 - 1934

This seasonal distribution of the rains permits the practice of a system of dry farming and such crops as cereals, beans, vetches, olives, almonds, vines and other crops are produced in considerable quantities. With the application of more modern and scientific methods of agricultural practices the yield of the crops produced by dry farming would be increased and the possibilities of crop failures in years of drought or during season when the distribution of the rainfall is unfavourable would be lessened.

Where irrigation water is available more intensive methods of farming are practised and a wider range of crops are produced. Without irrigation it would not be possible to produce in Cyprus such crops as citrus fruits and most of the fodder and summer crops which are now grown.

Owing to the number of crops which can be produced by dry farming being limited, irrigation is necessary for the needs and development of the Island but there are many areas where irrigation water is not available and there are also lands which are unsuitable for development under irrigation, therefore, further progress in agriculture in Cyprus lies in improving the existing system of dry farming and supplementing it by irrigation farming wherever it is possible.

The value of water to be used for irrigation purposes depends upon the quantity of solids contained in solution in it. This can only be determined by analysis and in view of the great variation in the quantity of soluble salts found in the irrigation waters of Cyprus it is desirable that supplies should be analysed.

If unsuitable irrigation waters are avoided it is rarely that soils in Cyprus become brackish. The nature of the soil, natural drainage and amount of winter rainfall all combine to prevent an accumulation of Sodium salts.

SOURCES OF IRRIGATION WATER.

The main sources of water supplies for irrigating crops in Cyprus are derived from perennial springs, mountain springs and streams, wells, chains of wells and storage reservoirs.

Crops and agricultural lands are also irrigated in winter by conveying to the fields silt laden flood waters from torrents in river beds and water courses.

The capacity of the large perennial springs such as the Kythrea and Lapithos supplies practically never varies during the year or from year to year. Supplies from mountain streams in years of normal rainfall are usually sufficient to supply the needs of the cultivators holding the water rights for the production of summer crops but these supplies diminish considerably towards the end of summer. The replenishment of well water supplies in Cyprus depends mainly on the annual rains and quantity of snowfall on the mountains in winter. During seasons of drought or following winters of shortage of rainfall the underground water supplies are often considerably depleted. Silt laden supplies depend entirely on the seasonal rainfall and can only be utilized irregularly as climatic conditions permit.

The supplies from perennial springs and mountain springs and streams are mostly used by the village communities in the neighbourhood of these sources. In some cases these supplies are not developed to the best advantage owing to any attempts to improve the distribution of the water being hampered by the existence of ancient water rights. Efforts are made from time to time to improve on the utilization of this kind of supply with a view to bringing an increased area under irrigation by more economical use of the water.

Most of the irrigation water used in Cyprus is derived from wells on private properties. Wells are either circular or squared and the sides lined according to the nature of the well and means to be employed to raise the water to the surface.

Chains of wells are made by sinking a number of wells at regular intervals, linking up the wells underground by tunnels, and bringing the water to the surface by gravitation. In some places chains of wells extend to a distance of over two miles and the capacity of a chain of wells may be as much as 650,000 gallons of water per day.

Owing to the varied character of the geological formation of Cyprus the possibilities of finding underground water is problematical in many areas. A few years ago the Government organized a systematic scheme for drilling for water by portable well drilling machines. A number of valuable irrigation supplies were found and the success in this venture has stimulated interest by private enterprise in the search for underground supplies.

There are three irrigation storage reservoirs which are situated in the eastern Mesaoria. These reservoirs which were constructed by Government along with certain other irrigation works between the years 1899 and 1901 are at Kouklia, Akhyritou and Syngrasi. The object of the Mesaoria scheme was to impound surplus flood water from the Pedias and other rivers for irrigation purposes and to reclaim swampy lands. Large areas of swampy land were reclaimed and converted into agricultural land but the irrigation scheme was not altogether a success mainly on account of the irregularity and insufficiency of the supply due to failure to collect sufficient water in years of drought and difficulties in controlling the flood waters during years of ample rainfall. Although the three reservoirs in their present form are designed to command an area of approximately 12,000 acres they are used on a very modified scale for irrigation purposes and not more than 4,000 acres are likely to be irrigated in any one year.

Irrigation by conveying silt laden flood water from river beds during the winter rains fulfils two purposes :—

(*a*) Irrigating cereals and other winter crops following spells of drought.

(*b*) Flooding fallow fields in preparation for planting summer crops especially cotton, melons and water melons.

This practice especially for the latter purpose plays an important part in the agriculture of Cyprus and besides its value from an irrigation point of view it has a most beneficial effect on the land. This system of irrigation has been practised from time immemorial and traces of ancient dams, canals and water channels are still evident. The Venetian system for controlling the flood water in the river Tremithias at Kiti village in Larnaca District is still in existence. A new dam has been built on the site of the old Venetian dam and several other new dams have been constructed.

Besides the above sources of supplies of irrigation water efforts have been made to form storage reservoirs in natural depressions in mountain valleys but at present no important projects of this nature or any other important source of irrigation supplies have been developed.

EXTENT OF IRRIGATION.

During the year 1935 the estimated area of irrigated and unirrigated crops produced in Cyprus were :—

Kind of Crop	Area planted		Remarks
	Irrigated donums	Unirrigated donums	
Wheat	—	573,250	When possible wheat fields are irrigated by silt laden flood waters.
Barley	—	346,859	
Oats..	—	35,912	
Maize	1,107	—	
Favetta	—	18,217	
Vetches	—	171,440	
Broad beans ..	—	14,645	One or two winter irrigations given before crop reaches maturity.
Potatoes	12,329	6,165	Two crops grow each year winter crop irrigated according to season. Summer crop dependent upon irrigation.
Cotton	10,739	32,217	
Sesame	—	7,076	
Cumin	—	12,878	
Onions	2,758	1,379	
Tomatoes	2,073	1,036	
Other vegetables ..	9,695	—	Includes colocasia, beans, cauliflowers, etc.
Citrus	11,700	—	
Other fruit trees ..	2,671	220	Includes pomegranates and deciduous fruits.
	53,072	1,221,294	

The irrigated areas referred to in the above and subsequent returns are crops irrigated from perennial water supplies. Fields irrigated by silt laden flood waters and cultivated land under vines, olives, carobs and almonds are not included.

The percentage of irrigated crops dependent entirely upon irrigation to non-irrigated crops of the total area under cultivation in 1935 was only some 4.5%. New areas of irrigable lands are being developed as irrigation water supplies become available especially for the development of citrus production.

The irrigation of winter crops by directing winter flood waters and surplus spring water is carried out extensively and at least some 10% of the cultivated area receives one or two irrigations in this manner.

The approximate percentage of areas of land irrigated in Cyprus from the principal sources of supply are :—

Source	Area under irrigation donums	% of total
Perennial springs and streams	18,000	33.9%
Wells	28,000	52.8%
Chains of wells	5,000	9.4%
Reservoirs	2,000	3.9%

MACHINERY AND APPLIANCES FOR MAKING IRRIGATION WATER AVAILABLE FROM WELLS.

The various types of water lifts in use in Cyprus for raising water from wells may be classified as follows :—

(*a*) Hand lifts adapted to lift water from a depth up to 25 feet ;

(*b*) Lifts operated by animal power for raising water from a depth up to 70 feet ;

(*c*) Windmills for lifting water from wells up to 100 feet deep ;

(*d*) Pumps and engines for shallow, medium and deep wells.

Hand types of water lifts are not used to a great extent for raising water for irrigation purposes in Cyprus. In some areas the Shadoff, locally known as the *Katia* or *Zygotiri*, is used on shallow wells not exceeding a depth of 25 feet for irrigating vegetable fields not more than one donum in extent. The Cyprus Shadoff consists of two wooden posts about 3 feet apart with a horizontal piece of wood joining the top to which is suspended a lever made from a tree branch. A forked tree stump is often used as the main post. On one end of the lever a stone weight is attached while from the end over the well a bucket or receptacle for raising the water is lowered into the well by a rope. This type of water lift is operated by one or two persons.

Water Wheels.—The most common method of raising water for irrigation in Cyprus is by the Persian water wheel locally known as an *alakati*. This type of water lift is eminently suitable for the small peasant proprietor who has an adequate well water supply at a depth of not more than 70 feet. The cost of maintenance of this type of water lift is practically negligible and the complete installation is made locally at a cost not exceeding £15. The wheel is operated by animal power, and the only maintenance expense is the supply of a small quantity of

lubricants for the bearings. If the installation is properly worked and the mineral contents of the water does not affect the iron the life of the appliance is approximately 25 years. The capacity of a Cyprus Persian wheel with seventy buckets is 1,800 gallons per hour and the approximate area which can be irrigated from the supply of an *alakati* is 6 donums.

In bygone days the *alakati* was completely made of wood but the various parts are now made of iron. In view of the importance of the *alakati* for irrigation in Cyprus the following description of the Cyprus locally-made Persian wheel is fully illustrated by a series of photographs. The description is prepared from a print drawn to scale by the Public Works Department and the photographs were kindly lent by Mr. Ramsay, Water Engineer, and Mr. Toundjian, of the Public Works Department.

The power pole is attached to a timber bearing fixed between two stone pillars and holding the horizontal wheel or skeleton drum in position. The horizontal wheel is four feet in diameter with 32 teeth approximately.

A vertical wheel also with 32 teeth approximately is adjusted over the well. A drum is rivetted to the vertical wheel and the water is raised in buckets attached to an endless chain which passes over the drum and deposits the water in the section of the drum directly underneath the bucket, the water then passes out through a discharge casting into a channel. The drum has a truncated cone centre 22″ in diameter at the larger end and 6″ in diameter at the smaller end. It is divided into 9 sections which are completely isolated and each section allows the water to pass through the discharge casting which is divided into 9 corresponding sections. When the wheel is operating a rapid outflow of water is obtained without any risk of returning the water to the well. A lever is adjusted at the side of the vertical wheel for preventing the drum reversing when the animal stops.

Windmills.—Raising water from wells by windmill is popular in many parts of Cyprus. This type of equipment is usually found installed in the grounds of private dwelling-houses for supplying water to irrigate the garden or in small fruit gardens 4 to 5 donums in extent. In the dry season there is usually enough wind of sufficient velocity to keep up the supply of water but an adequate storage tank is necessary to keep a reserve supply of water in hand.

The type of windmill in use in Cyprus is of modern construction with a vertically fitted wheel on a 40′ tower. The initial cost of this type of equipment is rather high for the relatively small area which can be irrigated and this kind of lift has gradually been replaced by pumps and engines.

The cost and capacity of a windmill depends mainly on the size of the wheel and the following figures are given as an approximate guide :—

Size of wheel	Approximate prices	Capacity of water per hour
8 feet	From £37	1,000 approximately
10 ,,	,, £50	2,000 ,,
12 ,,	,, £65	3,000 ,,
14 ,,	,, £75	4,000 ,,

Power Pumps.—The centrifugal pump driven either by electric motor or internal combustion engine is the type most favoured by the local farmer.

Only in exceptional instances, however, does the quantity of water available necessitate the installation of a pump having a delivery pipe greater than 3″ diameter.

Vertical plunger pumps, generally single acting, having one or more plungers have also a considerable following amongst the farmers, but as they are generally of greater initial cost and require greater attention they are being gradually supplanted by the more easily installed and operated centrifugal.

In many of the areas where Government artesian borings have revealed supplies of such quantity and at such depths as to effectively preclude the adoption of either of the above types of pump, proprietors have installed the turbo deep well unit having a delivery rate as high as 150 tons (33,600 gallons) per hour and driven by an internal combustion engine.

STORAGE AND CONVEYANCE OF WATER.

Storage tanks are required when the capacity of the *alakati*, windmill or power pump is less than 10,000 gallons per hour. These tanks are usually constructed of stone and their size depends upon the area to be irrigated and type of lifting installation.

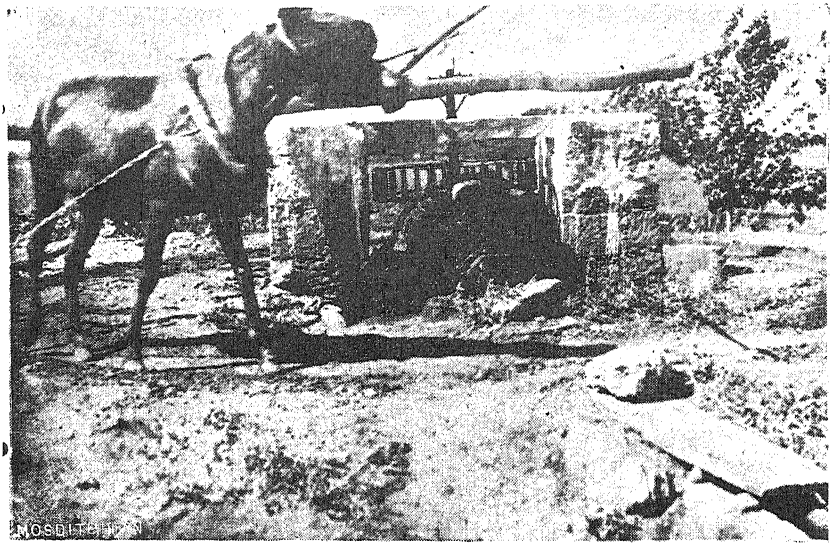
The average size of a stone storage tank for a 6-donum holding is approximately 14′×14′×4′. The cost of building a tank of this size is approximately £25.

When it is desired to pump the water direct to the land, a branch channel leads the water to the irrigation channels instead of direct to the tank.

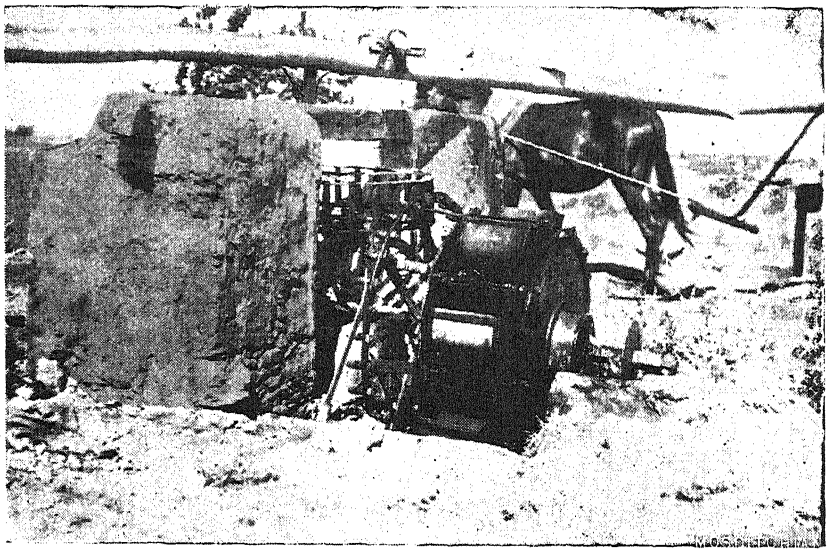
Storage accommodation is not usually provided for the perennial and chain of wells supplies as there is usually a sufficient flow of water from these sources for the irrigation purposes demanded from them and large storage reservoirs to economize in the use of these supplies or bring greater areas under irrigation have not yet been established. The surplus of these supplies is usually diverted into a river bed through which it returns to the underground supplies again.

Most of the water controlled by Irrigation Divisions in Cyprus from perennial and chain of wells supplies is conveyed to the cultivators in open earth channels and ditches.

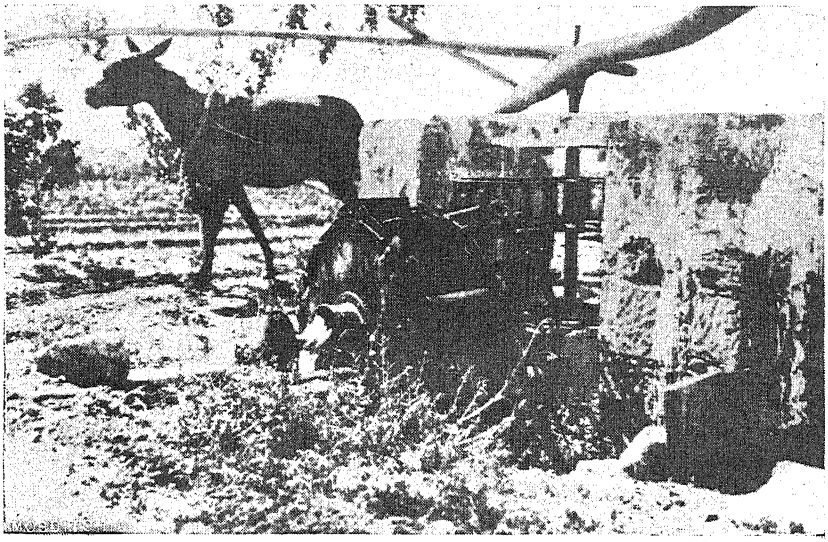
Where water is pumped to lands supplied by irrigation water from wells concrete channels are used to convey the water from the storage tank to the boundaries of the irrigable fields. The cost of constructing concrete channels depends upon the size of the channel.



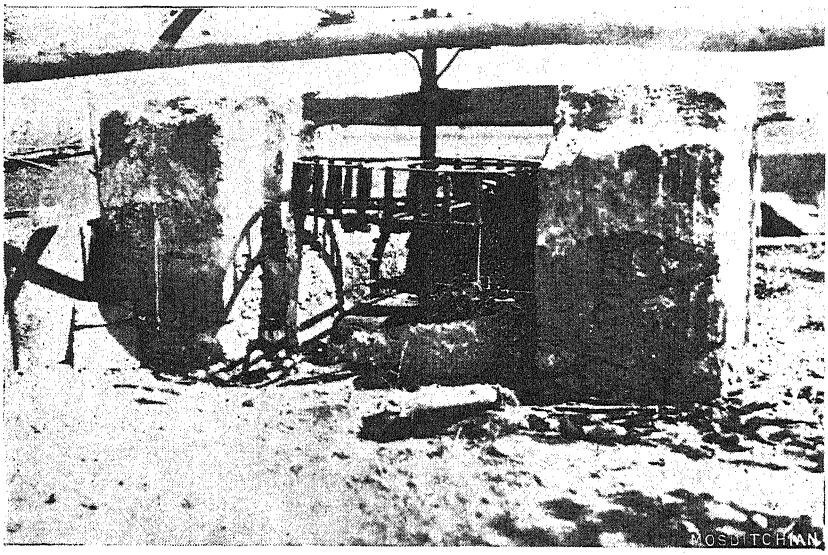
Alakati-front view showing drum and vertical wheel.



Alakati-side view showing endless chain of buckets.



Alakati-side view showing discharge casting.



Alakati-back view showing horizontal wheel or skeleton drum.

The following are approximate figures for three different sizes :—

Size of channel	*Cost per foot*
14″ wide × 12″ deep	6*cp.* 7 *paras*
10″ ,, × 8″ ,,	4*cp.* 13 ,,
8″ ,, × 6″ ,,	3*cp.* 1 *para*

The water in most of the recently established citrus groves owned by Jewish settlers is conveyed by underground concrete pipes. This system, including value of the concrete pipes, opening for the outlet of the water and laying down the pipes cost at present approximately 4*cp.* per foot.

WATER RIGHTS AND LEGISLATION.

The legislation at present in force providing for the control of irrigation water is governed by the Government Waterworks Law, 1928, the Irrigation Law, 1931, and the Wells Law, 1896.

The Government Waterworks Law 1928 which repeals the Irrigation Law, 1897, provides for—

(*a*) All underground water (including second water) for which no measures have hitherto been taken enabling such water to be brought or raised to the surface or to run on to the surface ;

(*b*) All water running to waste from any river, spring, stream or watercourse ;

(*c*) All other waste water ;

to be the property of the Government and written permission is required from the Commissioner of the District before any water as above described can be utilized.

All water in any river, spring, stream or watercourse, whether subject to private rights or otherwise in respect of which any waterwork is undertaken, shall after making necessary provision for private rights as provided for in the Law becomes the property of the Government.

In this Law provision is also made whereby Government has powers to take, store or divert water to construct waterworks, acquire land and remove obstructions.

If prior to the commencement of the undertaking, it appears that existing rights are likely to be affected injuriously in any way by the carrying out of any waterworks, Water Commissioners are appointed to enquire into the nature and extent of the injury to the water rights affected.

The construction of wells is provided for under the construction of Buildings, Streets and Wells on Arazi Mirié Law 1927. Under this Law provision is made whereby no well shall be sunk or constructed on lands of the Arazi Mirié category without first obtaining a permit from the Commissioner of the District in which such well is to be sunk or constructed. Practically all land in Cyprus comes under the category of Arazi Mirié which is State land, the ownership of which is held under title deed. Existing wells and water rights are safeguarded under the Wells Law, 1896,

The Irrigation Law, 1931, provides for the formation of irrigation divisions with or without Government aid for the following purposes :—

(*a*) The construction, improvement, maintenance or repair of any irrigation works lying wholly or in part within the lands of a village or group of villages;

(*b*) The protection of common waters or watercourses and for the regulation of the use thereof;

(*c*) The maintenance of the water rights of the proprietors.

This Law repeals the Irrigation and Water Law, 1887, and includes all works undertaken or constructed under the provisions of the Law repealed. The provisions of the law does not apply to water rights held by registered title or *ab antiquo* possession without the consent of the holders of such possession or the majority of the proprietors.

CONCLUSION.

The foregoing is a brief outline of the present position in regard to irrigation in Cyprus. No rapid strides have been made in recent years in irrigation development but there is a tendency on the part of cultivators to improve on their old established customs and to introduce methods which research in irrigation have proved to be more advantageous. Engineering investigations have been made from time to time and numerous projects for accelerated development in irrigation have been submitted to Government for consideration but owing to the conditions under which the Cypriot peasant farmer works his land, it has not yet been possible to embark on any large scale organized scheme by which the peasants could purchase adequate and assured water supplies.

Considerable progress has been made in exploiting water supplies on private properties and necessary steps are taken to instruct the cultivators in proper methods of raising, storage, conveyance, application and duty of water.

Citrus Wastage Trials, 1936.

BY R. M. NATTRASS, *Government Mycologist.*

1. DEMONSTRATION OF CAREFUL HANDLING.

ALTHOUGH it is a well-known and accepted fact that wastage of citrus fruit during transit to distant markets is caused in the first instance by injuries to the fruit during picking and subsequent handling, it was considered that a practical demonstration of the benefits of careful handling would do much to impress all engaged in the citrus export industry of the necessity for exercising the utmost care during the picking and packing of the fruit.

A small trial was arranged with the co-operation of Mr. A. Panaretos, Agricultural Officer, Famagusta, to be carried out on the fruit in the groves of the Government Experimental Citrus Station.

Five cases of fruit were picked by unskilled labourers in the way usually practised in the groves. The fruit was transported in baskets by motor-lorry to the packing shed and wilted for 7 days in a heap 6 to 8 fruits deep in accordance with the usual custom. The fruit was then wrapped and cased by skilled packers in a commercial packing house.

With the carefully picked fruit the pickers were equipped with locally-made cotton gloves, they were specially instructed to exercise special care in the use of the clippers and in every instance the stalk was clipped a second time before the fruit was placed in the collecting basket. The subsequent handling of the fruit resembled that of the control lot except that wilting was done in a layer two deep for the same period of 7 days, and until it was wrapped the fruit was handled at every stage with gloves. It was found that the wearing of a glove on one hand only was necessary for wrapping the fruit and that once accustomed to the feel it did not seriously affect the speed of the work.

The cases were transported by rail to Nicosia and placed in store for a further period of 23 days, *i.e.* 30 days from the time of picking. During this period the temperature of the store remained fairly constant at 60°F.

The cases were opened on 6th March and counts made of sound and wasted fruit with the following results :—

	Total No. of fruits	*Wasted fruits.*	% *Wastage.*
Careful handling ..	902	15 ..	1.6
Control..	772	66 ..	8.5

It is considered that injury to the fruit during picking and handling is caused largely by the points of the clippers bruising the fruit ; by badly cut stalks projecting from the fruit, and by the thumb nails of pickers and packers.

The above preliminary trial demonstrates that wastage can be considerably reduced by the exercise of due care and simple precautions.

2. CHEMICAL TREATMENT OF FRUIT AND WRAPPERS.

The preliminary trials carried out in the 1934–1935 season (2) showed that treatment of the fruit with " Shirlan," which had previously given good results in South Africa (1), and the use of wrappers impregnated with iodine showed considerable promise and warranted

a further trial. It was also necessary to ascertain the effect of such treatments on fruit arriving in Europe before further recommendations to the Cyprus producers could be made, and arrangements were made with the Secretary of the Cyprus Information Office in London, for experimentally treated fruit to be examined on its arrival at Covent Garden Market.

In previous consignments heavy losses had occurred through contact wastage, and it was considered that a more efficient method of isolating individual fruits or layers might do much to check this form of wastage. The two methods tried were the use of cellophane wrappers and the placing of a sheet of grease proof paper between each layer of fruit.

The iodine wrappers were prepared in the laboratory and as in the previous preliminary trial were impregnated with a solution made from the formula given by Tomkins (3). Each wrapper contained approximately 0.0127 grammes of iodine. The wrappers were kept in air-tight containers until used. The " Shirlan " solution used was of 1 per cent. strength of " Shirlan HB."

The fruit for the whole of this trial was picked from the same grove in Famagusta under ordinary commercial conditions on 5th February and was transported directly after picking to the packing shed, there being no adequate provision for wilting in the groves.

The " Shirlan " treated fruit was dipped immediately after arrival at the packing shed, the time of immersion being approximately half a minute. It was then spread out in a layer two deep and after twenty-four hours the fruit had dried with little signs of any deposit. It was left *in situ* for a further six days for wilting.

The fruit for the rest of the trial was wilted for seven days and was graded, wrapped and cased on 11th February.

One portion of the trial was transported by rail to Nicosia and kept in store for a period of 25 days and was examined on 6th March—31 days after picking.

The consignment to Covent Garden Market was shipped on S.S. *Destro* on 13th February and arrived in London on 29th February. The fruit was examined in Messrs. Margetsons' warehouse the following day.

The following report was received on the condition of the fruit and the amount of wastage present :

" Little waste was found in the fruit wrapped with iodised wrappers, which produced no ill effect on the appearance and consistency of the fruit.

Wastage was heavy in the cellophane wrapped fruit. The cellophane caused excessive sweating and did not check contact wastage.

The ' Shirlan ' treated fruit showed the best results. It was reported that ' the sound oranges were of excellent appearance and it was impossible to detect by look or smell that they had been treated in any way. The wrappers were perfectly clean.'

The sheets of grease proof paper between the layers of fruit did not check contact wastage.

Consignment ex S.S. "Destro," March, 1936.

Treatment	No of cases	Total No. of fruits	No. of waste	Percentage of waste
Iodised wrappers	20	2,991	117	3.91
'Shirlan'	5	702	27	3.84
Cellophane wrappers ..	14	2,282	342	15.00
Grease proof paper between layers	40	6,282	1,139	18.10

In this consignment no counts were made of any controls but the wastage on 477 cases was 40 cases or 8.37 per cent. Wastage of fruit from other consignments varied from 10 per cent. to 24 per cent.

The cellophane wrappers and grease proof paper appeared to have increased the amount of wastage.

The following figures were obtained on examination of the check consignment in Nicosia :—

Treatment	No. of cases	Total No. of fruit	No. of waste	Percentage of waste
'Shirlan'	8	1,021	25	2.4
Iodised wrappers	10	1,412	40	2.8
Cellophane wrappers ..	10	1,264	162	12.8
Control	10	1,372	106	7.6

It will be seen that these results agree closely with the figures obtained from the consignment to Covent Garden. The effect of grease proof paper between the layers of fruit was not tried in this consignment but the cellophane wrapped fruit showed an increase of wastage over the controls. The sound fruit in the cellophane wrappers presented a turgid and fresh appearance more attractive than any of the treated or control fruits. It appeared from the moist condition of the cellophane that excessive sweating was induced by this kind of wrapper and that conditions favourable to the development of waste were present."

Second Trial, 1935-1936 Season.

In view of the satisfactory report received of the "Shirlan" treatment and iodised wrappers it was decided to send a further and somewhat larger consignment of fruit with these two treatments to Covent Garden. It was anticipated that later in the season the amount of wastage would tend to increase and so provide a better test of the value of the treatment.

It will be seen below, however, that the wastage in the control was less than in the previous consignment. This may be accounted for by the fruit being mostly of the thin-skinned round varieties of the larger counts which under Cyprus conditions are not so liable to wastage as the thick-skinned oval types.

In this trial fruit was picked on 29th March, treated with "Shirlan" on 31st March, graded, wrapped and cased on 3rd and 4th April. The controls and iodised wrapped fruits were part of the same picking and were graded, wrapped and cased at the same time.

The "Shirlan" solution was a 1 per cent. "Shirlan" water soluble powder with .25 per cent. "Agral" added. About 100 fruits were dipped at a time in large wicker baskets and they were handled by workers wearing gloves. After draining the fruit was spread in layers two deep.

The iodised wrappers were impregnated with a slightly stronger solution than in the previous trial, each paper containing approximately 0.015 grammes of iodine.

The fruit was shipped on the S.S. *City of Lancaster* on 6th April and arrived in London on 22nd April.

The fruit was unloaded and examined on 27th and 29th April, with the following results :—

Treatment	No. of cases	Total No. of fruits	No. of waste	Percentage of waste
"Shirlan-Agral"	23	3,624	16	0.44
Iodised wrappers	10	1,478	9	0.61
Control	10	1,622	41	2.53

As a preliminary trial three cases of fruit were wrapped in cellophane wrappers coated with the same amount of iodine as the paper wrappers. No wasted fruit was found in any of these cases. The report also stated that neither the "Shirlan" treatment nor the iodised wrappers affected the selling qualities of the fruit one way or the other.

A portion of the trial was as in the previous trial transported to Nicosia, kept in store and opened on 1st May, with the following results :—

Treatment	No. of cases	Total No. of fruits	No. of waste	Percentage of waste
"Shirlan-Agral"	5	778	3	0.38
Iodised wrappers	4	594	9	1.50
Control	5	774	32	4.10
Iodised Cellophane wrappers	—	80	—	—
Control	—	39	1	2.50

In both portions of this trial both "Shirlan" and iodine showed a reduction of wastage over the control and "Shirlan" again showed a superiority over iodine and a greater superiority than in the earlier trial. This may be accounted for by the better technique of dipping, involving less damage to the fruit, and the incorporation of a wetting agent with the dip.

The incorporation of a fungicide in cellophane wrappers seems worthy of further experiment.

From these trials it appears that until such times as refrigerated ships and precooling plants are available a form of "Shirlan" dip may be recommended to reduce the heavy losses at present occurring, especially in the early consignments when the whole voyage has to be made with closed hatches. Later in the season most of the voyage is made with

open hatches which doubtless accounts in part for the reduction of wastage in these consignments.

Acknowledgments and thanks are due to Messrs. N. P. Lanitis & Co., for allowing the trials to be carried out on oranges shipped by them and for giving every facility in connection with treatments and packing, to Mr. A. Panaretos for invaluable assistance throughout and to Mr. Butler, Chief Grader and Inspector of Produce, and his staff for arragements for stowage on board, and especially to the Secretary of the Cyprus Government Information Office in London, for submitting reports on the condition of the consignments on arrival.

(1) Bates, G. R., "Wastage during the 1932 Export Season." The British South Africa Coy., Mazoe Citrus Experimental Station. Publication No. 2, c. 1933.

(2) Nattrass, R. M., "Prevention of Wastage of Citrus Fruit in Transit." *Cyprus Agricultural Journal*, XXX, pp. 84–87, 1935.

(3) Tomkins, R. G., "Iodised Wraps for the Prevention of Rotting of Fruit." *J. Pomol.*, XII, 4, pp. 311–320, 1934.

Topping and Suckering of Vines.

TOPPING of the vine is carried out during the summer season and is often referred to as summer pruning of the vine. Topping is carried out by vinegrowers in Cyprus on a fairly extensive scale especially in Paphos District, but usually it is done in such a way that it is more detrimental to the vine than beneficial.

The object of topping is to strengthen the growth of the young shoots and make them more resistant to the effect of wind damage, it also provides shade to the grapes by the formation of extra leaves which protect the fruit from the hot sun. The practice of topping is done by removing a portion of the shoots at the tip by pinching with the thumb and finger or by using a knife. It is important that the operation is done at the right season. Some growers carry out the operation with a view to securing a second flowering as the first crop is usually damaged by Eudemis. It is desirable that this practice should cease and it is advisable that growers practise topping more judiciously and at the proper time. By topping at the time of opening of the blossom, *coulure* or dropping of the flowers may be prevented. If topping is done earlier, secondary or auxiliary shoots will develop to the detriment of the setting of the flowers, if done later, *coulure* will not be prevented but the development of the already formed berries will be assisted.

Topping is usually advantageous at the time of the commencement of flowering. Vines lacking in vigour or suffering from insufficient moisture should not be topped as the operation may weaken the vine. Vigorously growing vines or vines growing in moist soils benefit by topping. Excessive or too late topping is detrimental to the vine and the grapes owing to the period of growth of the vine being prolonged. Late topping also lowers the sugar content of the grape.

Suckering is the practice of removing all suckers or growth which appear around the stem of the vine. By the removal of the superfluous growth the development of the remainder of the vine is assisted and the vine becomes more vigorous and productive. Suckering should be done as often as necessary during the season,

Potato Trials.

THE following summary of a (1) Report on Potato variety trials 1934–35, published in the *Journal of the National Institute of Agricultural Botany*, is published for the information of readers of this Journal in view of the local custom of using ordinary large size ware potatoes for "seed."

Part I of the Report deals with the effect of size of "seed" on the yields of the larger grades of ware potatoes and it is stated that previous investigations have established a relationship between the size of seed potatoes and both the total yield and the proportion of "ware" produced. Within certain limits a large sett tends to produce a heavier yielding plant than a small sett but the crop produced by small seed is made up of larger tubers. The trial was carried out to examine the effect of size of seed on the yield of ware potatoes, and cut setts were included in the trial as evidence was available that the use of cut setts leads to an increase in the proportion of ware in the crop.

The trial was carried out on a light sandy loam with three grades of seed referred to as large, medium and small. At the time of planting a part of the large seed was cut into halves and another part into quarters, the cuts being made longitudinally and referred to as halved and quartered seed.

The classes of setts tested were :—

Large,	with	an	average	weight	of	.. ..	5 oz.
Medium	,,	,,	,,	..	..	$2\frac{1}{2}$	,,
Small	,,	,,	,,	..	..	$1\frac{1}{2}$	,,
Halved	,,	,,	,,	..	..	$2\frac{1}{2}$	,,
Quartered	,,	,,	,,	..	..	$1\frac{1}{4}$	,,

The trial consisted of eight blocks, farmyard manure was applied at the rate of 16 to 18 tons per acre and at the time of planting the trial area received a dressing of 3 cwt. per acre of artificials containing equal parts of superphosphates, sulphate of potash and sulphate of ammonia. In the early stages the plants produced by the large setts appeared to be the most vigorous, owing to the production of a greater number of shoots; the growth of the plants from the quartered setts was irregular. At later stages no differences could be seen in the growth of any of the plots. The plots matured together and the produce was dressed over $1\frac{5}{8}$", $1\frac{3}{4}$" and 2" riddles.

In summarizing the results the crop of ware potatoes produced by the five classes of "seed" were compared. The yield of ware was reduced in each case by increases in the size of riddle from $1\frac{5}{8}$" to $1\frac{3}{4}$" and from $1\frac{3}{4}$" to 2".

Medium-sized whole tubers averaging $2\frac{1}{2}$ oz. in weight, produced heavier yields of ware than any other setts of smaller or equal size, and this superiority was increased when the ware was dressed over larger riddles. Larger seed produced similar yields of $1\frac{5}{8}$" and $1\frac{3}{4}$" ware to medium seed but was inferior to medium seed when a 2" riddle was used.

(1) "Potato Trials, 1934-35," B. Brandreth, B.A., *Journal of the National Institute of Agricultural Botany*, Vol. IV, No. 1, 1935.

Injurious Insects of Cyprus.

BY H. M. MORRIS, M.Sc., F.R.E.S., *Government Entomologist, Cyprus.*

[*Continued from March issue.*]

INJURIOUS INSECTS.

THYSANOURA:

Lepisma saccharina (Silver Fish, Fish Moth), occurs in houses and is destructive to paper, books and clothing.

ORTHOPTERA:

BLATTIDÆ (Cockroaches, "Black Beetles").

Blatta orientalis, L. and *Blatella germanica*, L., are common in houses, etc. *Periplaneta americana*, L., and *Polyphaga ægyptiaca*, L., also occur.

ACRIDIIDÆ:

Dociostaurus maroccanus, Thnb. (Moroccan Locust), is the most important locust and occurs abundantly. The area most seriously affected is the eastern end of the plain extending out to Cape Greco but they occur in all suitable parts of the plain extending westward to Morphou Bay. They also occur in the Karpas to the extreme end, in the area at the base of the Akrotiri Peninsula and westwards from Larnaca and Famagusta Bays. Small areas are also affected towards Cape Kormakiti and near the north coast.

This species breeds in hard uncultivated ground and the stoney ground thinly covered with a variety of plants in spring, such as occurs in patches throughout this area, is very suitable for it, these uncultivated patches occurring scattered amongst cultivated ground or in some areas being so extensive that the cultivated ground is in scattered patches amongst the uncultivated.

Oviposition occurs towards the end of May, the eggs hatching about the middle of the following March, hatching usually being 3 or 4 days earlier towards the eastern end of the plain than towards the western end.

A campaign is organized annually against this locust, a system of purchasing locusts which have been collected in hand nets being followed over the greater part of the area, poisoned bran bait being also used in some years since 1930 in some parts of the area affected.

Cereals are the principal crop affected by this species but the damage caused is usually small.

At the time of the British Occupation of Cyprus in 1878 very severe damage was caused annually by this locust and very extensive campaigns were necessary for some years until the numbers were considerably reduced, a system of screens and pits being employed. Spraying and poisoned bait were subsequently tried for a few years but were abandoned, and the collection of eggs was also carried out for a few years. The locust now occurs practically as a solitary grass hopper although very abundant in some areas. Hand collection commences soon after the hatching of the locusts and any tendency to form hopper swarms is soon broken up. The payment for the collection of the locusts is on the basis of the weight brought into the appointed purchasing places, and the price is reduced progressively with the growth of the insects and is maintained at a level such that an average labourer is able to earn a good days wage.

An account of this locust in Cyprus has been published by Stebbing (1).

Calliptamus italicus, L. (Italian Locust).—This locust occurs over much the same areas as *Dociostaurus maroccanus* but especially over the northern and western parts of the plain and to the north of the Akrotiri Peninsula, and it also occurs further west along this coast towards Paphos.

This species commences to hatch about three to four weeks later than *D. maroccanus*, towards the middle of April, and oviposition is correspondingly later.

This insect breeds in the edges of cultivated lands and especially in land which has gone out of cultivation for two or three years. Damage is sometimes caused to cotton seedlings.

This species is dealt with concurrently with *D. maroccanus*, being accepted for purchase at the same time.

Locusta migratoria, L. (ph. *solitaria*). (Migratory Locust).—The solitary form of this locust occurs. Conditions do not appear to be favourable for the development of the swarming phase and no damage by this species has been recorded.

Schistocerca gregaria. Forsk. (Desert Locust).—Invading swarms of this locust visited Cyprus in 1915, during the severe outbreak in Palestine and Egypt. There were two distinct periods of invasion, the first in March and April, and the second in August. The first swarms oviposited in some cases but the hoppers were destroyed shortly after hatching. The August invaders did not oviposit. Some damage was caused by the March and April swarms to vegetables, but more serious damage was caused by those arriving in August, some of which remained in the Island until December, during which time they were almost continually on the move and damaged vines, olive trees and other crops.

This 1915 invasion appears to have been the only one since the British Occupation in 1878. A single living specimen of this species was taken at Asomatos in the Akrotiri Peninsula on 5th May, 1930. Careful search in this and other areas failed to reveal any further specimens. A vague report was received, some three weeks after the event, of a swarm of locusts having passed over or spent a night at Alekhtora, a village in Limassol District, about 13th March, 1930. No further information and no specimens could be obtained.

While it appears that an invasion of Cyprus by this locust is possible during its years of maximum abundance in Syria, Palestine and Egypt, with the improvement of control measures in those countries the possibility of such an occurrence becomes more remote.

Thisœcetrus littoralis, Charp.—Some old specimens of locusts dated 1912, handed over to the Agricultural Department when the charge of the locust campaign was taken over by that Department were partly this species, but there is no information as to whether this was actually the most abundant species in that year. It occurs fairly commonly as a solitary grasshopper.

Anacridium œgyptium, L., is sometimes sufficiently numerous to cause slight damage.

A number of other species of Acridiidæ also occur but are not of special importance from the point of view of damage to crops.

(1). Stebbing, W. P. D., "The Locust in Cyprus," *Ann. App. Biol.* IV, 3, 1917, pp. 119–122.

TETTIGONIIDÆ:

Tettigonia viridissima, L. (Green Grasshopper, "Vrouchos").—This species causes a certain amount of damage occasionally, particularly to cotton and tobacco seedlings and also to broad beans. It is accepted for purchase with locusts during the locust campaign, but at a lower price owing to its larger size, when it is causing damage.

Decticus albifrons, Serv. ("*Skarnos*"), occurs similarly but usually in smaller numbers, and also *Metrioptera intermedia*, Serv.

GRYLLIDÆ:

Tridactylus variegatus, Latr., occurs fairly commonly and when present in numbers causes some damage to vegetables.

Liogryllus bimaculatus, Deg., has once or twice caused a certain amount of damage to vegetables.

Gryllotalpa gryllotalpa, L. (Mole Cricket), is a widely distributed pest in gardens and fields and is particularly destructive in seed beds or amongst newly-planted seedlings. Its burrows just beneath the surface of the ground cause shallow-rooted seedlings to be killed by drying out, while it custs through the main root of larger plants. The damage done is probably accidental in most cases as it is probably in search of insect and other animal food and does not usually eat plant material; it is nevertheless a very troublesome pest.

DERMAPTERA:

FORFICULIDÆ:

Several species occur, including *Forficula auricularia* L., but no damage has been recorded.

ISOPTERA:

Termites occur fairly commonly but as they are species which live in dead tree stumps or rotting wood they are not usually of importance. The only records of damage are the occurrence of termites in a bookcase in the Nicosia Club, when a bookcase and two or three books were damaged, some damage to shelves and paper stocks in the Government Printing Office and a case where termites damaged a few vine cuttings planted at Athalassa.

ANOPLEURA:

MALLOPHAGA.—No records available.

SIPHUNCULATA.—No records available.

THYSANOPTERA:

Species belonging to this order are only of importance occasionally, probably when conditions have been especially suitable for them.

Thrips tabaci, Lind, caused damage to melon plants in 1931 and measures were necessary against it. This insect has not been recorded as injurious in other years.

Cryptothrips brevicollis, Bagnall, was described as a new species and recorded as causing injury to vines in 1915 (Solomides) (1). Damage by this insect has not been recorded during recent years.

(1) Solomides, Z. S., "Notes on a Thrips injurious to vines in Cyprus," *Bull. Ent. Res.*, VI, 1915, pp. 197–199.

HEMIPTERA:

PENTATOMIDÆ.—A number of species belonging to this family occur but only two or three are of any importance.

Dolycoris baccarum, L. (Stink Bug, "Vromousa") occurred in large numbers in 1927 in the cultivated areas of the higher villages in the southern mountains from about 1,500 or 2,000 feet to the highest at about 3,500 feet, and caused a good deal of damage to cereals and various vegetables, (potatoes, beans, peas) and to various fruits. There had apparently been small and unimportant attacks in previous years which had not been reported but the damage that year was considerably greater. In 1928 the occurrence and damage were about the same but in the following years there was a considerable diminution.

The insects appear in the villages at about the same date annually, usually between 15th and 20th May. They are spoken of by the villagers as arriving in swarms and it has also been reported that they fly in swarms when leaving the villages in June.

By the time they reach the cultivated fields the cereal crops are almost ripe, but some damage is caused to them at first before the grains become too hard. Later they attack beans, potatoes, peas, vines, etc. They also attack fruit to a certain extent, particularly cherries, which is the only kind of fruit ripe then in that area.

The insects appear to prefer to feed in groups on a plant rather than scattered more or less uniformly over the crop. Their presence on potatoes soon causes wilting of the plant on which they are feeding, particularly of the younger parts of the plant on which they chiefly feed, and which do not recover. When they feed on bean pods they cause a spotting of the seeds inside; when wheat is attacked they feed on the ear and cause the grains to shrivel.

The insects appear to have a single generation only as the damage continues only until the last few days of June, about 6 weeks from its commencement, and the insects then disappear from the fields and collect chiefly on *Chionistra* and other summits of Mount Olympus (6,400 feet) and also on other of the highest mountains in the Island. In these situations they are to be found in masses under loose stones throughout the remainder of the summer and under the snow in the winter. When the stones are moved the insects are very active in hot sunny weather, but do not readily take to flight.

These summits are sparsely covered with dwarfed pine trees and various bushes, but the more succulent plants on which the Pentatomids might be expected to feed are going over and dying down by the time the insects reach these places, and they do not appear to feed at all during the time they spend on these summits.

In places where, as on the summit of *Chionistra*, there are piles of loose rocks the Pentatomids occur in enormous numbers and their presence can be recognized by the smell.

Commencing in 1928 great numbers of the insects have been destroyed, chiefly on *Chionistra*, by means of "Cyanogas" dust. It has also been found that an average of about 50% are parasitised by Tachinid larvæ, and *Gymnosoma rotundatum*, L., and another species have been bred from them.

There have been some reports of damage by these insects in the autumn, but the numbers then occurring in cultivated fields have been small.

Eurydema festiva, L. and var. *pictum*, H.S.—This species and its variety occur fairly commonly and damage is sometimes caused, particularly to potatoes, in various parts of the Island.

Eurygaster integriceps, Put., appears to be widely distributed but only slight damage has been recorded by it on one or two occasions. This species is a serious pest, particularly of wheat, in Syria, Turkey and Iraq where its habits appear to be very similar to those of *Dolycoris baccarum* in Cyprus.

Stenozygum coloratum, Kl., occasionally causes damage to young shoots of citrus.

Nezara viridula, L., has caused slight damage once or twice to vegetables.

A number of other species of Pentatomidæ occur but have not been recorded as causing damage to crops.

CIMICIDÆ :

Cimex (species not determined) (Bed Bug), occurs commonly in houses.

COREIDÆ, CAPSIDÆ, etc.—Various species occur but no serious damage has been recorded.

LYGÆIDÆ :

Oxycarenus hyalinipennis, Costa., is often abundant but does not cause serious trouble.

Lygœus pandurus, F., is common everywhere but has not been recorded as causing damage.

TINGIDÆ :

Stephanitis pyri, F., occurs abundantly in most areas on apple and pear trees and also (probably the same species) on poplar, and causes a certain amount of damage, and sometimes complete defoliation.

Galeatus scrophicus, Saund., taken damaging chrysanthemums.

CICADIDÆ :

Cicada orni, L., is the commonest species and occurs abundantly in the summer, when the noise they make is almost deafening. A certain amount of unnoticed damage must be caused to roots of fruit and other trees by the nymphs, which live in the soil. *Cicadatra atra*, Ol., is also common and *Tibicen plebeja*, Scop., occurs less commonly.

JASSIDÆ :

(Identification not received). Occurring on almond trees at Saittas and apples at Trikoukkia, causing curling of leaves and stunting of shoots.

PSYLLIDÆ :

Euphyllura olivina, Costa., occurs fairly commonly on olive trees but is not of great importance.

ALEYRODIDÆ :

Aleurolobus olivinus, Silvestri, is widely distributed on olive trees but unimportant.

Aleurotrachelous cyprusi, Dozier, occurs on pomegranates but is unimportant.

APHIDIDÆ.

Aphis rumicis, L. (Black Aphis, "Psora").—This species is a serious pest of broad beans but the incidence of the attack varies considerably from year to year. In bad years it may cause complete loss of crop in badly affected fields.

Aphis gossypii, Glov., occurs very commonly on cotton and melon plants and sometimes causes serious damage.

Doralis punicæ, Pass., is recorded on pomegranate.

Doralis pomi, Deg., recorded on apple.

Dentatus roseus, Baker, also recorded on apple but neither species is usually abundant.

Toxoptera aurantiæ, B.d.F., fairly common on citrus trees.

Lachnus persicæ, Burn., is fairly common on the trunk and branches of almond, peach and plum trees.

Brevicoryne brassicæ, L., common on cabbages, cauliflowers and other cruciferous plants.

Chromaphis juglandis, Goetze, occurs on walnut trees.

Hyalopterus arundinis, F., frequently causes a considerable amount of leaf curl on almond and peach trees.

Eriosoma lanigerum (Hausm.) ("Woolly Aphis"), occurs fairly commonly on the comparatively small number of apple trees growing in the lower parts of Cyprus, but is of small importance there. It also occurs in some of the higher areas where apples are an important crop, but the damage caused by it is not of serious importance.

COCCIDÆ:

Many species of scale insects occur on wild and cultivated plants, of which the following are the most important:—

Chrysomphalus aurantii, Mask. (Red Scale).—This species occurs very commonly on citrus trees, especially lemons, and in cases of heavy infestation causes defoliation. Carob, mulberry, rose and other plants are also attacked. This is the most important citrus pest in the Island and a certain amount of spraying and fumigation are carried out against it.

Aspidiotus hederæ, Vallot. (White Scale), is very common and widely distributed, occurring on a large variety of host plants. It occurs in great abundance on carobs in some areas but otherwise its attacks are not of great importance, although plantations of Wattle (*Acacia sp.*) are often heavily attacked. This species has been recorded [1] as occurring on lemons imported into Egypt from Cyprus, but search of citrus plantations in Cyprus had failed to reveal this scale on citrus, even in localities where the citrus plantations adjoin wattle which is heavily attacked by it. It is recorded as attacking lemon trees in Italy and France.

Aspidiotus lataniæ, Sign. (*cydoniæ*, Comst.)—This scale has been recorded [1] on citrus fruit from Cyprus on arrival in Egypt, but as a result of search in Cyprus it has been stated to occur in small numbers only and to be of little importance.

[1] Hall, W. J., "The Insect Pests of Citrus Trees in Egypt." Ministry of Agriculture, Egypt, *Tech. and Science Service Bulletin* No. 45.

Aspidiotus britannicus, Newst.—Recorded on carob, but unimportant.

The absence of *Chrysomphalus aonidum*, L., and *C. dictyospermi*, Morg., is worthy of note, and it is to be hoped that it will be possible to prevent their being introduced.

Ceroplastes rusci, L.—Very abundant on fig trees in several areas and causes some damage. It has also occurred on orange trees in one or two localities, the sooty mould which accompanies it causing discolouration of the leaves and fruit. It occurs commonly on oleander and *Cratagus azarolus*.

Ceroplastes floridensis, Comst., and *Icerya purchasi*, Mask., were introduced on citrus seedlings from Palestine in 1934 but efforts which have been made to eradicate them appear to have been successful and they may be completely eradicated.

Lecanium elongatum, Sign., occurs occasionally on carob but is unimportant.

Lecanium hesperidum, L.—This species occurs commonly on citrus but seldom in sufficient quantity to be of much importance.

Lecanium persicæ, Geoff., has been recorded on mulberry but is unimportant.

Lecanium (*Saissetia*) *oleæ*, Bern., occurs on olive and quince but is not abundant. This species has only occasionally been recorded on citrus in Cyprus although it is recorded as a serious pest in French North Africa (1).

Chionaspis striata, Newst, occurs on Thuja and Cypress.

Lepidosaphes ulmi, L.—Common on Carob.

Lepidosaphes beckii, Newm. (Mussel Scale).—Citrus trees in a small area including Limassol town were found in 1934 to be heavily infected with this scale. Extensive fumigation has been carried out since with a view to preventing its spreading to other areas.

Lepidosaphes conchiformis, Gmel., occurs on pomegranate.

Lepidosaphes ficus var. *nicosiæ*, Green, occurs on fig.

Leucaspis knemion, Hoke, recorded on *Pinus pinea*.

Leucaspis pusilla, Loew., recorded on *Pinus canariensis*.

Leucodiaspis riccæ, T.T.—This species occurs widely on olive leaves and fruit, sometimes in great abundance. Its presence on the fruit causes a dark patch.

Parlatoria oleæ, Colv., occurs commonly on fruit trees, (apple peach, loquat, etc.).

Parlatoria zizyphi, Lucas.—Stated (2) to occur on fruit, especially on lemons, imported into Egypt from Cyprus, but not otherwise recorded.

Parlatoria pergandii, Comst.—Stated (2) to occur in Cyprus; also recorded on apple.

Pollinia pollini, Costa., occurs commonly on olive trees.

Targionia vitis, Sign.—Common on vine.

Pseudococcus citri, Risso, (Mealy Bug.), occurs fairly commonly on various plants, including citrus trees, but not usually in any great numbers.

(1) Freeborn, S. B., "Citrus Scale Distribution in the Mediterranean Basin." *Journ. Econ. Ent.*, XXIV, No. 5, 1931, pp. 1025-1031.

(2) Hall, W. J., "The Insect Pests of Citrus Trees in Egypt." Ministry of Agriculture, Egypt, *Tech. and Science Service Bulletin* No. 45.

[*To be continued in September issue.*]

EDITORIAL AND ADVERTISEMENT NOTICES

All communications for publication should be addressed to the Editor, *Cyprus Agricultural Journal*, Department of Agriculture, Nicosia.

Contributions are invited, written on one side of the paper only. It should be understood that unaccepted manuscripts can not be returned unless postage is prepaid.

Copies of the *Cyprus Agricultural Journal* can be obtained on application to the Department of Agriculture, price 3*cp.* per number, or by post 4*cp.*

Annual subscription payable in advance 16*cp.* post free. Overseas subscription 18*cp.* (2/-).

SCALE OF ADVERTISEMENT CHARGES.

A special reduced rate is charged for all advertisements inserted. As the Journal is circulated throughout the Colony and copies are sent to all Colonies Overseas it may be regarded as a valuable medium for advertising.

The following are the rates in force :—

COVER—Full page, 1 year or 4 insertions ...	£2	0	0
INSIDE PAGES—Full page, 1 year or 4 insertions	1	12	0
„ Half page „	–	16	0
„ Quarter page „	–	8	0

For one insertion only, one-fourth of above charges.

All charges payable in advance.

PRIVATE ADVERTISEMENTS.

For Wants, Articles for Sale or Exchange, Notices of Meetings, Events, etc., for the first 16 words, 2*s.* Exceeding 16 words but not exceeding 32 words, 4*s.* For every additional 8 words 6*cp.*

Advertisements should be written on one side of the paper only, and should reach the Editor, *Cyprus Agricultural Journal*, not later than the 10th of the month of issue.

The "Cyprus Agricultural Journal" is published in March, June, September and December.

The Editor does not necessarily endorse the statements or opinions expressed in contributed articles, the responsibility for which rests with the authors.

The Horse Breeding Law, 1930.

LIST OF STALLIONS LICENSED FOR 1936.

NICOSIA DISTRICT.

Village	*Owner's name*	*Reg. No.*
Akaki	Michael Th. Rafti	29
do.	Elias M. Tsinga	203
Argaki	Polyvios Theophani	153
Astromeritis	Christoforos Evangeli	26
Elea	Rejeb Ahmed	254
Kalokhorio	Yioryis Papaconstantinou	262
Kochati	Halil Mehmed	264
Lefka	Yiangos G. Boyiadji	20
Lymbia	Andronikos Petri	32
do.	Kyr. Constantinou	33
Mammari	Sotiris Ioannou	206
Morphou	Vasilis T. Spanos	18
do.	Andreas Ahapittas	249
Nicosia	Haji Costas Haji Panayi	62
Philia	Towlis Haralambou	255
Yeri	Yeoryos Petri	16
Yerolakkos	Haralambos Sophokli	194

LARNACA DISTRICT.

Alaminos	Salih Jumaa	64
Aradhippou	Costis Kyriakou	15
do.	Lefteris Towli	225
do.	Gregoris Sava	261
Athienou	Yiangos N. Kalapodha	22
do.	Haris Antoni	66
do.	Costas N. Haji Vrashimi	96
do.	Vasilis M. Phiakou	159
Kalopsidha	Yeorgios Antoniou	267
Kophinou	Hussein Handji Ibrahim	209
Voroklini	Panayis Theodosi	106
do.	Haral. A. Chapoulis	220

FAMAGUSTA DISTRICT.

Angastina	Gavriel G. Kamenou	260
Asha	Antonis Michael	92
do.	Demetris Kounallis	208
do.	Christos Haji Lavithi	234
do.	Kyriakos Antoni	239

Village	*Owner's name*	*Reg. No.*
Ayios Andronikos ..	Spyros Yeoryi ..	65
do. ..	Christofis Hambi ..	240
Ayios Elias ..	Constantis Stylli ..	246
do. ..	Yeorgios Christodoulou ..	265
Ayios Seryios ..	Antonis S. Gizas ..	68
Ephtakomi ..	Loizos Hambaka ..	219
Famagusta ..	Ibrahim Mehmet Kallika ..	211
Galatia ..	Akil Mustafa Gonie ..	54
Komi Kebir ..	Kyriakos Antoniou ..	48
Kondea ..	Theocharis Alexandrou ..	193
do. ..	Christos Hanni ..	259
Lefkoniko ..	Mehmed Salih ..	38
do. ..	Christos Haji Symeou ..	41
Leonarisso ..	Chrysanthos Panayi ..	56
Lysi ..	Minas Lysandrou ..	80
do. ..	Artemis Haji Constandoura ..	227
Marathovouno ..	Loukas Poutsaras ..	43
Melanagra ..	Kallis Kyriakou ..	60
Milea ..	Loizos Panayi ..	257
Ovgoros ..	Djafer Emin A. M. Mustafa ..	213
Paralimni ..	Andreas K. Xiouri ..	72
do. ..	Evangelis Haji Vraka ..	172
do. ..	Evangelis Haji Vraka ..	245
do. ..	Nicolas G. Tsiakouras ..	210
do. ..	Demetris A. Maouris ..	244
do. ..	Avraamis Anastasi ..	258
Peristeronopiyi ..	Andreas Louka ..	45
do. ..	Const. K. Haji Yeoryi ..	73
Phrenaros ..	Kyriakos Theori ..	71
do. ..	Adamos Haji Theori ..	226
Rizokarpaso ..	Panayiotis K. Sakka ..	171
do. ..	Christofis N. Koulia ..	241
do. ..	Nicolas Chr. Barbotta ..	251
Sotira ..	Vasilis Demetri ..	252
Trikomo ..	Marikou Kyriakou ..	224
do. ..	Christos Demetri ..	101
do. ..	Kyprianos Stylli Haili ..	266
Vatili ..	Andreas G. Iona ..	86
do. ..	Christina Prokopiou ..	88
do. ..	Vasiliki Haji Christodoulou ..	89
	LIMASSOL DISTRICT.	
Anoyira ..	Thoukis Solomi ..	143
Asgata ..	Demosth. Evangeli ..	119
Ay. Amvrosios ..	Panayis Michael ..	223
Ay. Phyla ..	Costis P. Silikiotis ..	118

Village	*Owner's name*	*Reg. No.*
Episkopi ..	Bairam Mehmed ..	131
Erimi ..	Stephanos Apostoli ..	144
Pakhna ..	Theodoros Evgeniou ..	121
Limassol ..	Mehmed Mustafa ..	40
Mesayitonia ..	Demetris Karkallis ..	117
	PAPHOS DISTRICT.	
Amarketi ..	Mulla A. M. Mustafa ..	125
Dhrousa ..	Yiannis Sava ..	139
Kissonerga ..	Evangelis Haji Nicola ..	126
do. ..	Haji Towlis Haralambou ..	129
Kouklia ..	Mehmed Hassan Kokkinos ..	215
Ktima ..	Veli Tselebis ..	127
Lapithiou ..	Mehmed Mulla Osman ..	263
Lasa ..	Yeoryios Ch. Ellinas ..	130
Pano Arodhes ..	Harilaos Nicolaou ..	136
do. ..	Chrysost. Panayiotou ..	214
Phasli ..	Hassan Tahir ..	228
Phyti ..	Costis Georgiou ..	268
Prodromi ..	Avraamis Sava ..	248
Steni ..	Costis Pelekanides ..	230
Stroumbi ..	Sofoklis Constanti ..	178
Terra ..	Mustafa Yusuf ..	141
	KYRENIA DISTRICT.	
Agridhaki ..	Haralambos Yianni ..	147
Asomatos ..	Christallou Michaeli ..	146
do. ..	Antonis Haji I. Hanni ..	150
Ayios Amvrosios ..	Nicolas Haji Demetri ..	256
Ayios Ermolaos ..	Efstathios Christofi ..	166
Ayios Yeoryios ..	Costis N. Spanou ..	157
Bellapais ..	Savas K. D. Jirkaji ..	161
do. ..	Savas K. Demetriades ..	236
Dhiorios ..	Gregoris Haji Michael ..	148
Kampyli ..	Hussein Mehmed Kallika ..	247
Kyrenia ..	Shakir Hussein ..	158
Lapithos ..	Polyk. Panayioti ..	99
do. ..	Artemis H. Proestos ..	156
Larnaka tis Lapithou	Ioannis Costi ..	152
Myrtou ..	Cleov. Stylianou ..	149
Sisklipos ..	Lavithis Demetriou ..	232

ROBERT J. ROE,
Chief Veterinary Officer,
Inspector of Horse Breeding.

30th June, 1936.

Meteorological Data, Cyprus.

SUMMARY OF OBSERVATIONS AT REPRESENTATIVE STATIONS.

MARCH, 1936.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall Total inches	Rainfall No. of days rain	Rainfall Greatest fall in one day	Rainfall Average for 10 years inches	Rainfall Dates on which snow fall
Nicosia District :							
Nicosia	69.36	44.81	0.74	6	0.29	0.76	—
Athalassa	—	—	0.82	7	0.27	0.93	—
Morphou	—	—	—	—	—	0.59	—
Makhæras	—	—	—	—	—	1.75	—
Famagusta District :							
Famagusta	71.58	46.87	0.49	3	0.40	0.82	—
Akhyritou	67.90	44.00	0.45	3	0.27	0.89	—
Rizokarpaso ...	—	—	0.68	2	0.40	1.34	—
Lefkoniko	—	—	1.72	4	0.86	0.91	—
Larnaca District :							
Larnaca	71.00	44.00	1.26	6	0.48	0.95	—
Lefkara	—	—	1.03	4	0.40	1.15	—
Limassol District :							
Limassol	69.87	45.55	0.85	5	0.51	1.14	—
Saittas	—	—	1.13	6	0.76	1.75	—
Trikoukkia	53.87	37.48	1.60	4	1.10	3.09	—
Alekhtora	—	—	1.70	5	0.60	1.14	—
Paphos District :							
Paphos	—	—	1.90	2	1.65	1.40	—
Polis...	—	—	1.43	5	0.95	1.49	—
Kyrenia District :							
Kyrenia	66.17	48.19	1.04	5	0.47	1.25	—

APRIL, 1936.

Nicosia District :							
Nicosia	74.77	52.50	1.06	3	0.68	0.63	—
Athalassa	—	—	1.07	4	0.44	0.85	—
Morphou	88.33	49.00	0.13	1	0.13	0.48	—
Makhæras	—	—	—	—	—	0.74	—
Famagusta District :							
Famagusta	77.77	53.43	0.47	3	0.25	0.59	—
Akhyritou	75.00	52.10	0.79	5	0.37	0.60	—
Rizokarpaso ...	—	—	1.31	5	0.70	0.68	—
Lefkoniko	—	—	2.04	5	1.55	1.11	—
Larnaca District :							
Larnaca	76.00	52.00	1.07	5	0.47	0.81	—
Lefkara	—	—	3.15	2	3.10	0.89	—
Limassol District :							
Limassol	75.13	52.07	0.83	6	0.50	0.72	—
Saittas	—	—	0.50	6	0.20	1.02	—
Trikoukkia	60.52	45.00	1.08	4	0.50	1.81	—
Alekhtora	—	—	0.33	2	0.26	0.93	—
Paphos District :							
Paphos	—	—	1.32	4	0.70	0.83	—
Polis...	—	—	0.50	1	0.50	0.55	—
Kyrenia District :							
Kyrenia	71.20	54.40	0.15	4	0.04	0.84	—

Note.—Compiled from returns furnished by Public Works Department

MAY, 1936.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall Total inches	Rainfall No. of days rain	Rainfall Greatest fall in one day	Rainfall Average for 10 years inches	Rainfall Dates on which snow fell
Nicosia District:							
Nicosia	80.97	56.65	3.01	8	0.88	0.74	—
Athalassa	—	—	3.58	6	1.50	0.61	—
Morphou	88.64	54.48	2.55	5	0.90	0.33	—
Makhæras	—	—	—	—	—	0.54	—
Famagusta District:							
Famagusta	82.46	59.23	1.52	6	0.74	0.28	—
Akhyritou	79.80	56.70	2.43	6	0.92	0.26	—
Rizokarpaso ...	—	—	0.62	3	0.36	0.61	—
Lefkoniko	—	—	3.13	7	1.85	0.96	—
Larnaca District:							
Larnaca	82.00	56.00	0.50	5	0.15	0.21	—
Lefkara	—	—	2.06	6	0.64	0.35	—
Limassol District:							
Limassol	78.84	57.39	1.15	6	0.42	0.25	—
Saittas	—	—	4.85	9	1.60	0.80	—
Trikoukkia... ...	—	—	4.65	8	1.32	1.28	—
Alekhtora	—	—	1.22	3	0.70	0.48	—
Paphos District:							
Paphos	—	—	1.15	8	0.30	0.48	—
Polis...	—	—	0.65	4	0.42	0.49	—
Kyrenia District:							
Kyrenia	75.25	58.17	1.60	7	0.49	0.58	—

Note.—Compiled from returns furnished by Public Works Department.

Department of Agriculture, Cyprus.

HEADQUARTERS—NICOSIA.

ALL general correspondence should be addressed to the Director of Agriculture.

Correspondence and applications for advice referring to the Veterinary, Entomological, Mycological or Chemical Branches, should be addressed to the Officer in charge of the Branch. When seeking advice in regard to treatment of plant pests or diseases, specimens should, whenever possible, be sent.

GOVERNMENT STOCK FARM, ATHALASSA AND DISTRICT STUD STABLES.

Applications for services of stud animals at Athalassa or the supply of live stock, poultry, eggs, etc., should be addressed to the Manager, Stock Farm, Athalassa. Applications for services of stud animals at District Stud Stables should be made to the Stud Groom in charge. There are Stud Stables at Famagusta, Vatili, Rizokarpaso, Ayios Theodhoros, Lefkoniko, Larnaca, Limassol, Paphos and Polis.

CENTRAL EXPERIMENT FARM, MORPHOU.

Applications for permission to visit the Central Experiment Farm, Morphou, should be made to the Officer in Charge of the Farm.

SAITTA EXPERIMENTAL VINEYARD AND VITICULTURIST'S LABORATORY.

Requests for the examination of wines and advice in regard to viticulture should be addressed to the Viticulturist and Wine Expert, Limassol.

DISTRICT ORGANIZATION.

Applications for agricultural advice should be addressed to the Officer in charge of the district or area in which the applicant resides. All applications for seeds or plants should be made to the Officer in charge of the nearest Nursery Garden.

NICOSIA DISTRICT.

Agricultural Officer, Mr. S. Maratheftis, is in charge of the district, including the Nursery Garden, Nicosia, and Officers are stationed at Kythrea, Dheftera and Morphou.

Lefka Sub-District.—Agricultural Officer, Ibrahim Hakki Effendi, is in charge, including Pyrgos area.

FAMAGUSTA DISTRICT.

Agricultural Officer, Mr. A. Panaretos, is in charge, including Famagusta Nursery Garden and Citrus Experimental Grove. Officers are stationed at Yialousa, Vatili, Lefkoniko and Trikomo and Tobacco Instructor at Yialousa.

LARNACA AND LIMASSOL DISTRICTS.

Agricultural Officer, Mr. M. Papaiacovou, is in charge, including Larnaca Nursery Garden. Officers are stationed at Larnaca, Lefkara, Nisou, Agros and Limassol.

KYRENIA DISTRICT.

Agricultural Assistant, Mr. E. Kyprianides, is in charge, including Kyrenia Nursery Garden, Lapithos Citrus Station and Lapithos area. Tobacco Instructor, Mr. E. Demetriou, is stationed at Kyrenia District.

PAPHOS DISTRICT.

Assistant Superintendent of Agriculture, Mr. A. Klokkaris, is in charge. Paphos District includes Paphos and Polis Nursery Gardens and Officers are stationed at Polis, Stroumbi, Yeroskipos and Ayios Amvrosios (Limassol District).

TROODOS AREA.

Trikoukkia Nursery Garden and Troödos area is in charge of Mr. K. Hamboullas, Agricultural Assistant.

Table Showing Distribution of Stud Animals at the Stud Stables and Government Stock Farm, Athalassa on 1st July, 1936.

Station	*Stallion*	*Jack Donkey*	*Bull*	*Breed*
Athalassa	Corby Bridge	No. 42 (Spanish)	No. 480 (Ambassador)	Shorthorn
	Moleskin	No. 38	No. 456	Kerry
	Mazarin	—	No. 469	Cyprus
Ay. Theodoros	Pitchford	No. 50	No. 461	Cyprus
Famagusta	Friars Flutter	No. 51	No. 443	Cyprus
Larnaca	Lifeline	No. 52	No. 462	Crossbred
Lefkoniko	Marcher Lord	No. 54	No. 468	Cyprus
Limassol	Canterbury	—	—	—
Morphou	—	No. 47	—	—
Nicosia	—	—	No. 450	Crossbred
Paphos	Llwynog's Model	No. 41	No. 454	Kerry
			No. 459	Cyprus
Polis	—	No. 49	No. 451	Kerry
Rizokarpaso	—	No. 45	No. 460	Cyprus
Vatili	Waterkoscie	No. 48	No. 458	Cyprus

Notes: 1.—There are also Boars at all the above stations except Nicosia, Morphou and Limassol and there are he-goats at all stations except Morphou, Limassol and Vatili.

2.—The Stallion at Limassol will travel to Evdhimou and back, and that at Paphos to Polis and back, every month.

3.—Boars and he-goats may be issued on loan to *bona fide* applicants upon application to the Director of Agriculture or Manager Stock Farm, Athalassa.

The Cyprus Agricultural Journal

A QUARTERLY REVIEW

OF THE

AGRICULTURE, FORESTRY AND TRADE OF CYPRUS

Vol. XXXI, Part 3 SEPTEMBER, 1936 Price 3cp.

EDITORIAL NOTES

Agricultural Situation.

Weather conditions have continued somewhat abnormal throughout the past three months with occasional rain. In consequence fungus diseases have been prevalent, particularly on vines and there has been some further damage to cereals on the threshing-floors. Prices of agricultural produce have been satisfactory. Wheat has been much in demand and prices have risen in sympathy with the general rise in world prices. Deciduous fruits have realized high prices both locally and for export and the apple crop has been of much better quality than ever before owing to more general spraying for the prevention of Codlin Moth attack. Cotton is late this year and it is expected that losses from Boll Worm attack will be considerable. Live-stock has remained in good condition but grazing is becoming scarce. Carob production has been poor in parts but the quality is good and prices have been satisfactory. A medium citrus crop is expected and early purchases have been made at 25*s*. per 1,000 for oranges and 18*s*. for lemons. Common grapes are being exported to Egypt in considerable quantities and there have been several requests for improved varieties of table grapes. When these are available in larger quantities it is confidently expected that a valuable trade can be built up.

* * * * * * *

Buyers representing the Greek Government have purchased during the past few weeks over 500 tons of seed wheat of the varieties Kyperounda, Psathas, Tripolitiko and Akanthiotiko. While the quality of seed wheat available was not so good as in the previous year owing to rust attacks and bad weather at harvest time, the buyers report that there has been a marked progressive improvement in the type and quality of seed wheat offered during the past seven years.

Complaints are still made of the large admixture of dirt in the seed wheat and the best sample in type and quality offered was refused owing to the large proportion of foreign matter it contained.

There is a good demand for barley of good quality and in good condition from the United Kingdom.

A considerable demand for selected wheat seed from the Central Experimental Farm at Morphou has arisen and all available seed has

already been sold. Farmers are increasingly realizing the importance of the use of selected wheat seed and it is hoped that this demand will rapidly extend in the case of other crops.

* * * * * * *

VINE GROWING.

Discontent among vine growers in the main producing areas at the prices offered for their produce and the difficulty met with in selling it, led to the calling of two largely attended meetings of growers, the latter of which submitted a series of resolutions to Government. The main reasons for the vine growers' difficulties are the contraction of the market for wines in Egypt and the loss of the German market for raisins. The main demand of the growers is the revocation of Law 25 of 1928, and permission for uncontrolled or less strictly controlled export of wines to the United Kingdom. It is abundantly clear to any one with a knowledge of the wine market in the United Kingdom that uncontrolled marketing would be likely to result in the partial loss of such export to the United Kingdom as now takes place. The method in force of permitting export under licence only and confining licences mainly to the only firm which has up-to-date and efficient wine-making plants and facilities to hold stocks has resulted in securing a market in the United Kingdom for about a quarter of a million gallons of wine and 500 tons of must annually in the face of strong competition from better quality wines of Empire origin. While it may be felt that the United Kingdom market may and should be further developed, any development will be achieved by more organization and control of marketing and not by permitting unorganized shipments of different types and qualities of wine to be sent. Government has been giving the matter much consideration and attention as a result of which it is hoped that this market may be expanded in the immediate future.

* * * * * * *

COTTON.

Late spring rains resulted in cotton planting being later than normal and attack by Pink and Spiny Boll worm is heavy especially on rain grown cotton. Later pickings will be very poor. Apart from the attacks of insects the quality of Cyprus cotton is much reduced by the use of mixed seed and by improper methods of picking. The Agricultural Department is taking steps to provide pure seed for use in the most important cotton-growing area in 1937, but results will not be satisfactory unless planting is early and the cotton is properly picked. A large majority of growers cling to the method, non-existent outside Cyprus, of snapping off the whole boll in the field, storing under dirty conditions in the houses and picking the seed cotton out of the dry boll in winter. In consequence bits of stalk and leaf remain in the cotton together with much dust and the value is naturally reduced. Ginning is mainly done by " Saw " gins which again reduce the quality of the lint. Cyprus has been able to market this inferior cotton satisfactorily in Greece up to the present but that market is being gradually and certainly lost and there is little hope of successfully entering a new market until the quality is improved. Properly prepared Cyprus cotton is well reported on in England and could readily be marketed there at satisfactory prices.

CYPRUS SHIPPERS' ASSOCIATION.

The second meeting of the Council of the Cyprus Shippers' Association was held on 5th August. The main subjects discussed were the position with regard to the balance of trade between Roumania and Cyprus; Roumanian and German debts; the establishment of a Monthly Cyprus Import and Export Gazette for the Association and the relationship between the Association and the newly-formed Citrus Shippers' Association. It was decided to invite the Committee of the latter Association to meet the Council and discuss the position. The Citrus Shippers' Association were, however, unwilling to meet the Council. Later a meeting was arranged on 18th August which representatives of the Citrus Shippers' Association promised to attend but they did not appear at the meeting.

* * * * * * *

CO-OPERATIVE MARKETING.

The Kakopetria Apple Growers' Co-operative Association experienced a most successful season and secured excellent prices for their crop. Encouraged by this example steps have been taken to form a similar organization at Perapedhi.

For the same reason and in view of the formation of the Citrus Shippers' Association, which it was believed intended to agree to offer a lower price for citrus than in past seasons, Co-operative Marketing Associations are in process of formation among the Famagusta Orange Growers, the Karavas Lemon Growers and the Morphou Orange Growers.

Co-operative selling Associations are in process of formation also at Stroumbi, Polemi and Kathikas for the sale of grapes in Egypt. The three Societies are working in union. After considerable difficulties in the case of the first few shipments it is believed that satisfactory arrangements have now been made for marketing and shipping. Growers have been promised not less than 1*cp.* per oke for ordinary grapes and a market for some 800 *kafizas* a day has been secured.

* * * * * * *

AGRICULTURAL SHOWS.

The following Agricultural Shows have taken place during the past three months.

On 17th July, Potato Show at Akhna. Excellent exhibits of potatoes were on view and dances and poems in honour of the potato were given. A medal was presented to Mr. Hambis Mouscovias who first introduced potato growing into Akhna.

On 29th and 30th August the first Pitsillia Show was held at Agros. Very creditable exhibits of fruits and wines were shown.

On 4th to 6th September an Agricultural and Industrial Show was held at Limassol. Industrial and manufacturing exhibits were prominent and some of the larger firms had most tastefully arranged pavilions to exhibit their products. Wines, brandies, tiles, machinery, were practically noteworthy. The Show was honoured with a visit by His Excellency the Acting Governor and the Rt. Hon. Sir Samuel Hoare, First Lord of the Admiralty, who were much impressed with the exhibits.

On 8th September the Agricultural and Animal Show at Lysi was held. This Show was not so well supported as in 1935, but some excellent live-stock was on view and particularly good exhibits of barley were seen.

MYCOLOGICAL NOTES.

Seed Corn Treatment.

It is expected that a greater amount of seed will be treated this year than in past years, owing to the good results obtained by the farmers who treated their wheat and barley seed last year.

The Agricultural Club of Xeri village has arranged to treat over 700 kilés of seed corn for its members. It is hoped that the good example of this progressive Agricultural Club will be followed by other agricultural societies for the benefit of the farmers, in view of the great losses caused every year by the Smut diseases of cereals, which can be prevented by a simple seed treatment.

Tomato Disease.

A fungus disease (*Oidiopsis*) has caused a great amount of damage to the tomato crop throughout the Island as in previous years. Demonstrational spraying carried out at Kythrea, Louroujina and Paleometokho gave very satisfactory results for the control of this disease.

Severe damage to tomatoes was also caused by mites, which were successfully controlled by dusting with sulphur.

* * * * * * *

VETERINARY AND LIVE-STOCK NOTES.

A considerable amount of damage was caused by late rains to the grazing in many parts of the Colony. Stubbles and dry natural pastures, which would otherwise have provided plenty of food for the flocks until the winter, became sodden and rotten, and there is likely to be a shortage of grazing unless the autumn rains are early and frequent.

Flock owners are advised to provide supplementary feed—ground oats or barley with vetch straw—during the next couple of months, especially to pregnant ewes, and to drench all flocks every three or four weeks with copper sulphate solution which is obtainable free of charge from the Veterinary Service.

* * * * * * *

The number of sheep in the Colony is the highest for fifty years and the number of goats is the highest since 1911 while the extent of grazing area is becoming less each year. Unless, therefore, supplementary feeding and other improved methods of flock management are generally adopted, heavy losses are likely to occur in adverse conditions of climate or if pasture becomes further depleted.

The general condition of flocks at present is very good and forage supplies for large animals and for hand-feeding flocks are plentiful.

* * * * * * *

In the 1936 Anthrax campaign over 730,000 sheep and goats were vaccinated during a period of ten weeks in April-June. The vaccine appears to have given complete protection to sheep but some outbreaks of anthrax in goats have been reported in areas known to be heavily infected and in which proper attention is not being paid to the all-important necessity of burying carcasses.

* * * * * * *

The following live-stock has been purchased for the Government Stock Farm and is expected to arrive in Cyprus early in October: One Irish Draught stallion, one Dale Pony stallion, one Kerry bull, one Shorthorn bull and four Shorthorn heifers and a number of Rhode Island Red and White Leghorn poultry.

Citrus Fruit Wastage.

BY DR. R. G. TOMKINS

(Department of Industrial and Scientific Research, London).

[*Reprinted from the Monthly Journal "Hadar," April*, 1936.]

Memorandum presented at a meeting of the Citrus Fruit Committee on the 26th of March, 1936.

WASTAGE.

LOSSES in Jaffa oranges sent to the English markets are chiefly due to rots caused by green mould.

Three conditions are essential for the occurrence of rots :—

(1) Spores must be present on the fruit.
(2) The fruit must be liable or susceptible to attack by the fungus.
(3) The conditions of storage must be suitable for the development of rot.

The extent of rotting experienced in any instance is determined by all three conditions, though in certain instances it is possible to attribute the losses more particularly to one of the conditions.

THE EFFECT OF THE NUMBER OF SPORES PRESENT.

If no spores are present, no rotting occurs, whatever may be the conditions of transport.

The greater the number of spores present, the greater the risk of rotting. For example, sample boxes of South African oranges were dusted with green mould spores. Waste was thereby increased from 2 to 30%.

Spores get on to the oranges chiefly in the picking shed. If any of the oranges in the wilting piles become mouldy, the spores are transferred to the surrounding oranges. Spores get into orchard boxes and into brushing machines. Spores settle from the air of the pack-house. If managers of pack-houses take care that no mouldy fruits get into the pack-house, that orchard boxes and grading machines are clean, the chances of losses from green mould are largely reduced. If they do not, they are bound to suffer losses. Excessive losses should in the first instance be blamed on the packer for allowing spores to get on to the fruit.

THE EFFECT OF SUSCEPTIBILITY TO INVASION.

Absolutely sound fruit is considered not liable to attack. If oranges are mechanically damaged, *i.e.* scratched with nails, or damaged by grit or stung by flies, while spores are present, rotting follows. That is why damaged oranges are removed in grading.

It is also important to prevent damage to oranges after packing. Damage can be caused by rough handling of boxes and by bumping, which in its turn may be caused by driving loaded lorries at excessive speeds over bad roads.

Seemingly sound oranges may bear minute wounds and be open to attack by fungi, if spores are present. It is quite well known that Jaffa oranges picked toward the end of the season are more liable to attack than oranges picked earlier in the season. It is difficult, but not impossible, to measure exactly how liable to attack any sample of oranges may be. For this reason it is difficult, but not impossible, to say exactly to what extent chemical manure, type of stock, age of tree, weather conditions, or wilting influence liability to rot. All of these factors have some influence on the liability to waste, but not as much as is often supposed.

EFFECT OF CONDITIONS OF TRANSPORT.

If oranges are wounded and spores are placed on the wound, rots develop. Development takes time because the soft rotten condition follows the development of the fungus in the tissues. The number of days, in which rot reveals itself depends chiefly on the temperature.

The minimum time for development at various temperatures is as follows :—

5°C	30 days	20°C	3 days
10°C	10 ,,	25°C	3 ,,
15°C	6 ,,		

Of course, when the wounds are small the rot may take longer to develop. If one is considering large samples it is best to ask how long it will take for 10% of the sample to rot. For 10% of the fruit to rot it will not take the minimum times given above, but 3–4 or 5–6 times as many days. It is certain that the longer samples of oranges are kept, the greater will be the number of rotten fruits. Therefore, they should be sent to the market as soon after packing as possible. The amount of waste experienced is, for similar samples, roughly proportional to the days taken to arrive in England, *i.e.* the sum of the days :—

(1) Between packing and loading onto the ship.
(2) Between loading onto the ship and the time of sailing.
(3) Between leaving Palestine and reaching England.
(4) Between discharge and selling.

There are often grave delays, between picking and loading due to :—

(1) Lack of transport.
(2) Difficulty of making up consignments.

There are often delays of ten days between loading and sailing due to :—

(1) Lack of supplies.
(2) Storms delaying loading.

The time taken up to make the voyage depends on the speed of the ship and weather conditions.

All delays, whatever the cause, contribute equally to increase waste.

The lack of ventilation on ships is often said to be the chief cause of excessive waste. There is said to be evidence that carriage in certain ships always results in excessive waste. Such statements should be accepted with caution.

Ventilation is practised :—

(1) to remove the heat produced by the oranges.
(2) to remove the Carbon Dioxide produced.
(3) to remove the volatile products.
(4) to reduce the humidity of the atmosphere.

The advantage of removing the heat is obvious. To do this the air introduced must be below the temperature of the fruit and this may not always be the case.

Ventilation removes the Carbon Dioxide and volatile products, but it is not known whether their presence has any effect on the extent of rotting.

Ventilation may reduce the humidity of the air in the hold, but again it is doubtful how far this may influence rotting.

It is, therefore, impossible to be certain how far ventilation as practised on ships, influences the extent of waste. Ventilation as such is not important, its value lies in the extent to which it prevents increase of temperature and accumulation of Carbon Dioxide, volatile vapours. Temperature conditions, the amount of Carbon Dioxide present and the relative humidity could all be measured, but ships are not fitted with the appropriate equipment. Therefore, for the present, the real effect of ventilation is not known, and is a matter of surmise and opinion only.

To summarize : If waste is reported in a consignment of oranges arriving in England do not rashly assume that one factor alone has been the case, but try to apportion the blame more evenly between :—

(*a*) the spores, the packer allowed to get on the fruit ;
(*b*) the presence of damaged oranges, which should not have been packed ;
(*c*) the damage inflicted by a drive at excessive speeds over rough roads ;
(*d*) the delay caused by waiting for a " good " ship, instead of loading seven days earlier onto a " bad " ship ;
(*e*) the delays caused by storms at Jaffa ;
(Shippers can partly overcome all these causes ; even storms at Jaffa can be avoided by shipping through Haifa.)
(*f*) the unknown conditions to which the fruit is subjected on the ship, and which the chief engineer controls to the best of his ability.

Ceratitis capitata, Wied.

MEDITERRANEAN FRUIT FLY.

BY H. M. MORRIS, *Government Entomologist.*

THIS insect is a serious pest of many kinds of fruit throughout the Mediterranean region and also in South Africa, Australia and other countries, where its attacks continue throughout the year on the various kinds of fruits as they ripen.

The adult fly is a little smaller than the common house fly and is chiefly yellow in colour with brown, black and white markings. The head is yellow, and while it is alive the eyes are emerald green. The back of the thoracic region is shining black with white markings while the abdominal region is yellowish with two transverse white bands.

The wings are very characteristic and when the fly is at rest they are held in a half closed position and rather below the back, instead of closed and above the back as with most flies. The wings are also very characteristically marked with a transverse band of yellowish and greyish colour, a longitudinal band of similar colours near the fore edge, and another patch of rather paler colour near the end, and they also bear a number of blackish markings near the base.

The adult flies live about four to eight weeks or longer and the females lay 300 to 400 eggs, or even more, laying about 20 eggs a day. These eggs are white and elongated and are about one-twenty-fifth of an inch (1 mm.) in length, so that they are not easily seen in the fruits. The eggs are laid below the skin of fruits, usually in groups of 2 to 6, and the larvæ on hatching from the eggs burrow and feed in the flesh of the fruit until they are full grown. Many of the attacked fruits fall to the ground (most of the attacked fruits in the case of oranges). When the larvæ are full grown they leave the fruit and enter the ground where they pupate, usually just below the surface. In due course the adults emerge from the soil and again attack any fruits which may be suitable. Under favourable conditions in summer the life cycle may be completed in about 3 weeks, but in winter it may require 3 months. The number of generations in a year varies a great deal according to the climatic conditions, but in the coastal regions of Cyprus there are probably 6 or 8 generations.

The full-grown larvæ are active white maggots about five-sixteenths of an inch (7 to 8 mms.) in length and the pupæ are brownish and about three-sixteenths of an inch (5 mms.) in length.

A very large variety of fruits and vegetables may be attacked under suitable conditions but the fruits chiefly preferred are peaches, pears, mandarines and thin-skinned oranges. Figs, grapefruit, prickly pears, quinces and mulberries are also readily attacked, while even broad beans, cucumbers and carob pods may be attacked.

In order to lay their eggs the flies pierce the skin of the fruit, and the eggs are then laid below the skin. The puncturing of the skin in this way causes a small discoloured patch to appear on most kinds of fruit, thus giving an early indication that the fruit is attacked. In later stages of the attack much of the interior of the fruit may be destroyed, and the damage due to the larvæ is greatly increased by fungi and bacteria which obtain admission through the oviposition puncture and eventually cause the complete decay of the fruit.

When citrus fruits are attacked early in the season a large proportion of the eggs do not hatch, or if they do hatch the larvæ fail to develop, owing to the presence of oils in the skin of the fruit. In ripe citrus fruit the attack develops normally and is often severe. Although the larvæ do not develop in the unripe fruit the oviposition punctures nevertheless enable fungi and bacteria to enter and cause rotting.

CONTROL MEASURES.

Destruction of Fallen Fruit.

Owing to the larvæ living buried in fruits no direct measures are possible against them except by the destruction of attacked fruits. As most fruits when attacked by the larvæ fall to the ground before the development of the larvæ is completed, the destruction of such fallen fruit is a valuable means of preventing the development of the larvæ and the increase of subsequent generations of the flies, but as the larvæ may leave the fruit soon after it falls to the ground it is necessary that the collection and destruction of fallen fruit should be carried out daily. Instead of destroying fallen fruit it may be used for juice extraction but the pulp remaining from this process should be destroyed in the same way. Fallen fruit or pulp should be destroyed by placing it in a hole in the ground, covering it with a layer of lime and then filling the hole with soil, which should be well trodden down, so that there is at least a foot of soil above the fruit.

This collection and destruction of fallen fruit should be done for all the usual fruits which are attacked, but in the case of oranges, owing to the larvæ failing to develop in unripe fruit, it is not necessary before about 1st December.

Avoidance of Alternative Host Plants.

It is seen from the account which has been given of the life cycle that the insect requires fruit in a suitable condition for its attacks all through the year, attacking the various kinds of fruit as they become ripe. If, therefore, there is a sufficiently long period during which there is no fruit available for attack the flies will die out without breeding. It is, however, very difficult to attain to this condition owing to the very wide range of fruits and vegetables in which the fly could breed, if necessary, and also owing to the relatively long life of the flies.

Traps.

This method depends upon the attraction of the flies to certain substances which are used as baits in traps. The traps may be of various types, the most convenient being a glass globe with a somewhat conical entrance below, the bait being put in and removed by a hole at the top which can be closed by a cork. These traps are easily hung in the fruit trees by means of a string or wire, being hung in a sunny place during the cooler months and in the shade or half shade of the leaves during the hot weather. It is necessary for the bait to be renewed fairly frequently as it spoils or dries up, once a week being sufficient in cool weather but more frequent attention being necessary in the summer.

A number of different materials or mixtures may be used in such traps, one of the most effective and convenient being a proprietory material known as " Clensel " which for use is diluted with water at the rate of one part of " Clensel " to 30 parts of water.

Water in which bran has been soaked is also a good bait, borax being usually added in addition to delay excessive fermentation. The proportions used are as follows : bran 20 drams ; borax 20 drams ; water 1 oke. This mixture may be put in the traps or the bran and water may be allowed to stand about two days, until a smell of fermentation is given by the mixture, when the water is poured off and used in the traps and the bran is discarded.

If desired these baits may be used in open jars or pans, in which case two drams of sodium arsenite should be dissolved in each oke of water, but the use of this poisoned bait has the disadvantage that it entails the use and exposure of considerable amounts of poisonous material.

Another useful bait is prepared by boiling dried figs in water for half an hour, at the rate of 1 oke of dried figs to 10 okes of water.

Various other materials may be used as baits but those given above are the most convenient and satisfactory.

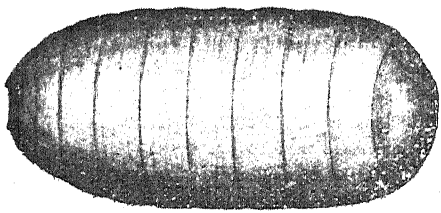
The number of traps used is of great importance as the distance from which flies are attracted to the traps is small. For large apricot or similar trees two or three traps should be used in each tree, and for large citrus trees there should be one trap in each tree if possible.

The dates from which the traps should be hung in various kinds of fruit trees are as follows :—

(*a*) For loquat trees from 1st February.
(*b*) For apple, apricot, black mulberry, caisha, cherry, medlar, peach, pear or plum trees from 1st May.
(*c*) For fig or pomegranate trees from 1st July.
(*d*) For citron, grapefruit, lemon, lime, mandarine, orange or quince trees from 1st August.

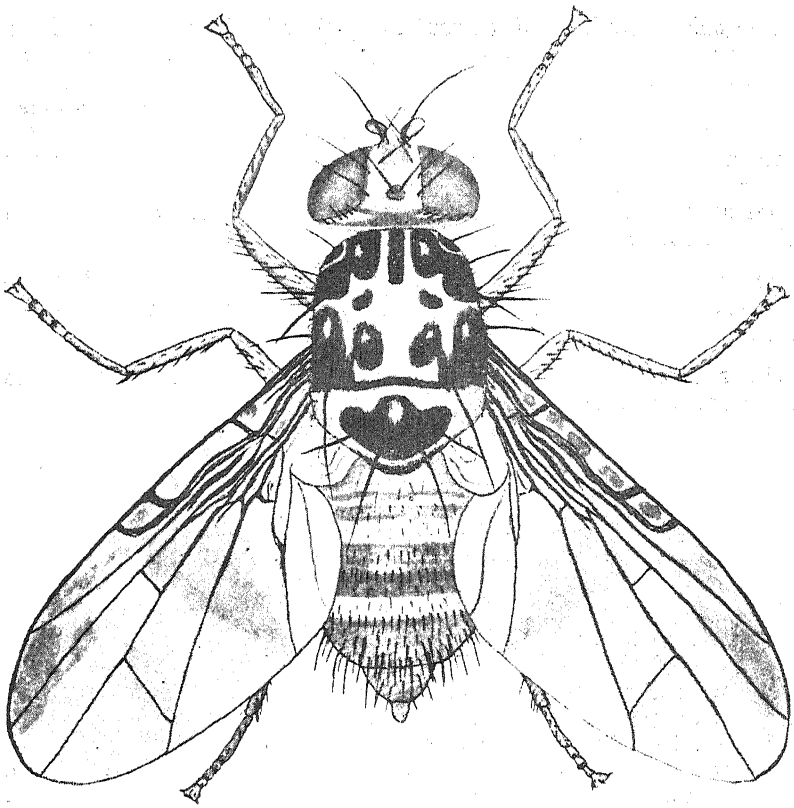
Bait Spraying.

This method consists of spraying or sprinkling on to the fruit trees a small amount of a substance which is attractive to the flies but which also contains poison so that the flies feeding on it are killed. This bait spray is not sprayed in the same way as ordinary sprays but only a small amount is used, about 30 to 100 drams per tree according to the size of the tree.

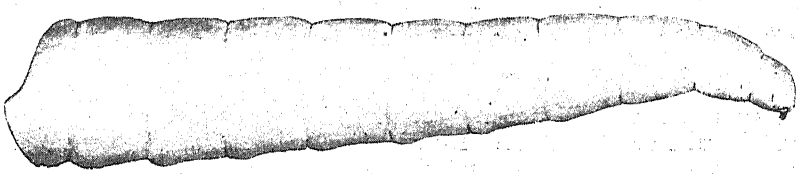


Pupa of the Mediterranean Fruit Fly.

(*The small figure indicates the actual size.*)



The Mediterranean Fruit Fly (*Ceratitis capitata*).
(*The small figure indicates the actual size.*)



Larva of the Mediterranean Fruit Fly.
(*The small figure indicates the actual size.*)

The bait spray is applied about every 8 or 10 days as required, or renewed more often if it is washed off by rain, and the application of the bait is commenced about the same dates as those given in the previous paragraph for the various kinds of fruit, and the applications are continued until all fruit is removed from the trees. The bait is sprayed lightly on to the leaves, chiefly on the upper part of the tree and on the sunny side, the fruit being avoided as much as possible. All trees bearing fruit should be treated from the dates given, and also any other trees near in which the flies may shelter.

The most satisfactory bait to use is prepared in the following proportions : 1 oke sodium fluosilicate, 30 okes white sugar and 600 okes of water.

Other mixtures may also be used but the one given is probably the most convenient and satisfactory.

General Recommendations.

The most satisfactory control of *Ceratitis* will probably be obtained by a combination of the measures described above.

Bait spray should be applied during the period indicated but if used in conjunction with traps it may not be found necessary for the bait to be applied during the whole period.

A certain number of traps should be used (say one to each twenty trees) and very carefully watched, and as soon as it is found that *Ceratitis* are being caught in the traps bait spraying should be commenced and continued until no *Ceratitis* appear in the traps. The attention to the traps should be continued and bait spraying re-commenced when required. It is of course essential that the traps should be very carefully watched as their function is to indicate when the bait spraying should be carried out, and the spraying must be done as soon as the presence of *Ceratitis* in the traps indicates that it is necessary.

These traps should in particular be placed on trees which tend to ripen their fruit early owing to irregularities of the soil or other causes.

In addition, all fallen fruit should be collected and disposed of daily and as far as possible different kinds of fruit trees should not be grown together, as in mixed plantations *Ceratitis* is given the greatest opportunities for breeding all the year.

* * * * * * *

Two series of experiments are now being carried out by the Agricultural Department near Nicosia to compare the baits described above and also to test other materials which may possibly be of value as baits.

Injurious Insects of Cyprus.

BY H. M. MORRIS, M.Sc., F.R.E.S., *Government Entomologist, Cyprus.*

[*Continued from June issue.*]

LEPIDOPTERA :

TINEINA :

Phthorimœa operculella, Zell. (Potato Tuber Moth, "Lita").—This species is generally distributed, particularly in the lower parts of the Island, and causes damage to potato tubers, particularly to those in store in the summer, the autumn crop being little attacked while stored during the winter. Potato leaves and stems are also attacked but no attack on tobacco has been recorded in Cyprus.

Sitotroga cerealella, Ol.—Grain is usually stored without any precautions against insect attack, being generally heaped on the floor of a room or building which has not been prepared in any way since the removal of the previous crop. The same room is also often in use for other purposes. Grain also becomes infected while waiting loosely piled before threshing, and on the threshing-floors. This and several other grain, infesting species occur very commonly.

Platyedra gossypiella, Saund. (Pink Boll Worm).—A rather heavy attack by this species and *Earias insulana* usually develops in cotton bolls towards the end of the summer in all areas. The practice of sowing cotton rather late, so that the crop matures in October and November, causes this damage to be more serious than if the crop matured in August and September when the attack is slight.

Anarsia lineatella, Zell.—Generally distributed, attacking peach, apricot and cherry shoots.

Recurvaria nanella, Hb.—Attacks peach and apricot buds and appears to be widely distributed in the Island.

Syringopais (*Scythris*) *temperatella*, Led.—This insect is a serious pest of cereals in several areas and sometimes causes the complete loss of the crop in heavily attacked fields, though while occurring abundant in some localities it is apparently completely absent from closely adjacent localities. An account of it was published by Wilkinson. (1) The larvæ mine in the leaves of cereals, wild grasses and some other plants, appearing towards the end of December or early in January but becoming more noticeable in March. Pupation takes place in the soil early in April and the adults appear towards the end of April. The eggs appear to be deposited in the soil, where they or the first stage larvæ remain until the following winter. The adults exhibit strongly marked sexual dimorphism and are strong fliers, flying in the day time and becoming sluggish towards evening. It was discovered by Wilkinson that the adults were strongly attracted to light, but experiments carried out by the present writer, while amply confirming this, showed that males only were attracted, although in two successive nights a total of nearly 30,000 insects were estimated to have been caught in one light trap.

(1) Wilkinson, D. S., "Some Notes on *Syringopais temperatella*, Led., in Cyprus," *Bull. Ent. Res.*, XVII, 3, 1927, pp. 313-314.

Various control measures have been proposed but the most practicable appears to be the cessation of growing cereals for a period of years, other crops not attacked by the insect being grown, and all fields lying fallow being cultivated to destroy any larvæ feeding on weeds.

Plutella maculipennis, Curt. (Diamond-Backed Moth), frequently causes damage to cabbages and cauliflowers, particularly to seedlings.

Hyponomeuta padellus L. (Small Ermine Moth, "Sirividhi of Fruit Trees").—This insect is a serious pest of apple and plum trees in the southern mountains, where these fruits are chiefly grown, frequently causing severe defoliation.

Prays oleella, Fabr. (Olive Moth), is a serious pest of olives and occurs in all the chief olive-growing areas. It has three generations during the year, larvæ passing the winter feeding on the leaves of olives, two leaves often being spun together and the larva living and feeding between them and also pupating in this situation. The adults of this generation appear early in April. The second generation of larvæ appears amongst the flowers, on which they feed, and the third generation of larvæ live inside the stone of the fruit. This is the most obviously destructive stage and the attacked fruit is often rather shrunken and wrinkled but probably the greatest damage is actually caused by the second generation. When these larvæ are full grown, during September, they leave the stone by the microphyle and bore straight out of the fruit, leaving it by a hole beside the stalk attachment, the effect of this boring being to cause a considerable proportion of the infested fruits to fall from the tree prematurely.

Polychrosis botrana, Schiff. (Grape Berry Moth, "Eudemis").—This insect occurs wherever vines are grown and causes a considerable amount of damage, in some cases almost complete loss of the crop. There are three generations in the year, the larvæ of the first appearing during May and feeding on the flowers of the vine, spinning them together with a web, destroying the flowers and preventing the formation of the fruit. The larvæ of this generation pupate in the flower or young fruit bunches or on the leaves. Larvæ of the second generation appear about the middle of June and the larvæ of this and of the third generation enter the grapes, which are spoiled by their attacks and that of moulds which follow them in the damaged fruit. The winter is passed as a pupa under loose bark on the vine or stakes, under dead leaves on the ground or in similar places.

ÆGERIDÆ:

Aegeria myopiformis, Bkh. (Clear Wing Moth).—Larvæ of this species live under the bark of apple and pear trees, probably spending two years in the larval stage, causing considerable damage to trees attacked.

COSSIDÆ:

Zeuzera pyrina, L. (Wood Leopard Moth), is a destructive and generally distributed pest of various kinds of trees (olive, pomegranate, apple, etc.), and causes a considerable amount of damage to fruit trees.

TORTRICIDÆ:

Cydia (*Carpocapsa*) *pomonella*, L. (Codling Moth) occurs abundantly wherever suitable fruits are grown, chiefly in the southern mountains where apples and walnuts are especially attacked, and also peaches, plums, pears and quinces. It may have three generations during the year but there is much overlapping and the third is probably not complete. Control measures against this insect have been enforced for a number of years but

are rarely thoroughly carried out, the irregular and over-closely planted trees making the work difficult, while effective spraying is hardly practicable in many cases in the small overgrown hill-side gardens. This insect occurs in almost all countries where apples are grown.

Olethreutes (*Argyroploce*) *pruniana*, Hubn., causes some damage by feeding on the young leaves of apricot and also attacks apple and plum. This insect occurs in England, France, South Russia, etc.

PYRALIDÆ :

Ephestia elutella, Hubn.—This insect causes some damage to stored grain but is not one of the most serious pests. This pest is very widely distributed having been carried from country to country in grain, seeds, etc.

E. kühniella, Zell., *E. afflatella*, *Mn.* and *E. cautella*, Wlk., also occur in dried fruit, etc.

Plodia interpunctella, Hbn.—Reported in dried figs from Cyprus in England.

Myelois ceratoniæ, Zell., is chiefly a pest of carob pods in store but also attacks the pods while they are on the trees. It has also been found attacking almonds on the trees, apparently preferring the shell, and it is also a pest of dried figs. This insect appears to occur in the Mediterranean basin but may have been introduced elsewhere in dried fruit, etc.

Epicrocis anthracanthes, Meyrick, bred from larvæ on leaves of almonds.

Hellula undalis, F., sometimes damages cabbages and cauliflowers both seedlings and older plants by boring the head. It has been recorded in other countries as damaging radishes in addition to cabbages and cauliflowers. This insect is recorded from India, Malaya, Japan, Queensland, etc.

Galleria mellonella, L. (Wax Moth).—Pest of bee hives.

Pyralis farinalis, L., occurs but is not abundant.

Margaronia (*Glyphodes*) *unionalis*, Hb., includes the olive amongst its food plants but is not usually sufficiently abundant to cause appreciable damage.

Phlyctænia fulvalis, Hb., bred on potato leaves but not a serious pest.

ZYGÆNIDÆ :

Zygæna (*Theresia*) *ampelophaga*, Bayle, (Vine Bud Moth), is a serious pest of vines in Cyprus, particularly in the southern mountains. It is not quite clear how the winter is passed but it is believed that this period is spent as a young larva under loose bark, stones, fallen leaves, etc.

The larvæ are present about the time the leaf buds swell and commence to open in April, and buds attacked at this stage are completely destroyed so that when many buds are so attacked the growth of the vine is seriously checked and may be entirely prevented. A second generation of larvæ appears at the end of May and in June and feeds on the leaves, but the damage then caused is of much less importance.

In Palestine this insect is a major pest in the hilly country and is considered to overwinter as a young larva about 5 mm. in length. In the Crimea the life history is similar, the insect occurring only in the valleys of the southern coastal district. In south-eastern France it is believed to pass the winter in the egg stage while in Italy it is believed that this period is spent in the pupal stage.

SPHINGIDÆ:

Acherontia atropos, L. (Death's Head Hawk-Moth), occurs occasionally on potato and *Datura*, and possibly also on vines.

Deilephila livornica, Esp., occurs occasionally on *Linaria* in gardens, and on vines.

Chœrocampa alecto, L., occasionally causes damage to vines and to virginia creeper.

THAUMETOPŒIDÆ:

Thaumetopœa wilkinsoni, Tams. (Pine Processionary Caterpillar).—This insect is a serious pest of pine trees in Cyprus attacking chiefly the Aleppo pine (*Pinus halepensis*), some areas of which are almost completely defoliated annually. Its life history has been fully studied in Cyprus by Wilkinson (1). In the plains the adults emerge chiefly during September and the eggs are laid in cylindrical masses on pine needles during September and the first half of October. The larvæ hatch at the end of October and early in November, and commence eating the pine needles, only the epidermis being eaten until the third instar. The processionary habit is already in evidence in the first stage larvæ, and within a few days they commence forming small silken nests. The later instars construct larger nests, which are used as shelters during the day-time although almost fully grown larvæ rest on the outside of the nest.

The later larvæ migrate from tree to tree, or for pupation, in single file, the head of one larva touching the end of the body of that in front. Pupation occurs in the ground during March and April, the summer being passed in the pupal stage in the soil.

GEOMETRIDÆ:

Sterrha herburiata, F. var., has been reared from larvæ found attacking dried plants in a herbarium collection.

NOCTUIDÆ:

Earias insulana, Bois. (Spiney Boll Worm).—This species, with *Platyedra gossypiella*, is a serious pest of cotton. The larvæ feed early in the season on the buds and leaves of the cotton plant but the most serious damage is caused later in the season when the maturing bolls are attacked. In addition to cotton this insect also attacks mpamia (*Hibiscus esculentus*) and it has been recorded elsewhere as attacking carob beans and maize, as well as other plants but it has not been recorded from these host plants in Cyprus.

Laphygma exigua, Hb., attacks a large variety of plants in its wide range which includes California, South Europe and most of Asia and Africa, but in Cyprus it is chiefly injurious to potato leaves and tomatoes. Amongst its food plants are cotton, beet, cereals, vines, cabbages and onions.

Heliothis (*Chloridea*) *obsoleta*, F.—This widely distributed species is recorded from tomato and maize, but it has been recorded elsewhere from cotton, stone fruits, tobacco, lucerne, etc. It is practically world-wide in distribution and is reported to occur in North, South, East and West Africa, Australia, North, South and Central America, West Indies and India amongst other countries. It does not appear to be as destructive in Cyprus as in many other countries.

(1) Wilkinson., D. S., "The Cyprus Processionary Caterpillar, *Thaumetopœa wilkinsoni*, Tams." *Bull. Ent. Res.*, XVII, 2, 1926, pp. 163–182.

Phytometra gamma, L. (Silver Y Moth), occurs in most European countries, South-West Asia, North Africa and Western-North America, and attacks a veriety of plants. In Cyprus it is recorded from broad beans.

Prodenia litura, F., is another species of world-wide distribution and is chiefly a pest of cotton, although attacking a variety of crops. In Cyprus it is recorded as damaging potato tops but does not appear to be a pest of cotton.

Cirphis ? loreyi, Dup., bred from larvæ on maize and sorghum.

Other Noctuidæ whose larvæ cause damage to various crops and which occur in Cyprus include *Phytometra chalcytes*, Esp. (bred from larvæ on tomato), *Agrotis pronuba*, L., *A. ypsilon*, Hufn., *Euxoa radius*, Haw., and *E. spinifera*, Hb.

ARCTIIDÆ:

Ocnogyna læwi, Zell. ("March Worm"), feeds chiefly on grasses in the larval stage, the larvæ living in colonies and moving in a disorderly mass from plant to plant. Cultivated plants are occasionally attacked, particularly broad beans. An attack on cumin has also been reported.

PAPILIONIDÆ:

Papilio machaon, L. (Swallow Tail Butterfly), is common and its larvæ have been found feeding on carrot leaves, and also on orange leaves.

PIERIDÆ:

Pieris brassicæ. L. (Large White Butterfly) and *P. rapæ*, L. (Small White Butterfly), occur abundantly and their larvæ cause damage to cabbages, cauliflowers, etc.

Aporia cratægi, L. (Black-veined White Butterfly), occurs locally in the southern mountains but no damage due to it has been recorded.

NYMPHALIDÆ:

Charaxes jasius, L.—Larvæ taken on young citrus trees.

Eugonia polychloros, L. (Large Tortoiseshell Butterfly).—Larvæ occasionally taken on pear and cherry.

Pyrameis cardui, L. (Painted Lady Butterfly), occurs abundantly throughout the year and its larvæ have been found damaging artichokes. An extensive invasion occurred in 1935 and the larvæ caused serious damage to artichokes.

LYCÆNIDÆ:

Lampides bœticus, L.—Larvæ of this species have been recorded as damaging French beans, broad beans and cow peas by feeding on the unripe seeds inside the pods and in the flowers.

COLEOPTERA:

CARABIDÆ:

Zabrus gibbus, F., which has been recorded as causing damage elsewhere, occurs in Cyprus but has not been recorded as destructive to crops.

TROGOSITIDÆ:

Tenebroides mauritanicus, L.—A pest of stored grain but is also predaceous on other stored grain pests.

NITIDULIDÆ:

Carpophilus hemipterus, L., bred from decaying tomatoes; is also a pest of dried fruit.

Carpophilus dimidiatus, F., taken on rotting orange, and is also a pest of dried fruit.

Meligethes æneus, F., occurs but no damage recorded.

CUCUJIDÆ:

Silvanus surinamensis, L.—A pest of dried fruit and stored grain.

COCCINELLIDÆ:

Epilachna chrysomelina, F., is a pest of melons and related plants, sometimes causing serious defoliation.

Several beneficial species of Coccinellidæ (Lady Bird Beetles) have been recorded, of which the most important are *Chilocorus bipustulatus*, F., and *Coccinella 7-punctata*, L. The latter species sometimes occurs in enormous numbers on the rocks on the summit of Chionistra (6,400 feet) in the summer in company with *Dolycoris baccarum*, L. When seen from a little distance small rocks or patches of stone appear completely scarlet from the numbers of this insect resting on them.

DERMESTIDÆ:

Dermestes undulatus, Brahm., has been recorded but not causing noticeable damage.

Anthrenus verbasci, L., is a troublesome and destructive pest of insect collections.

Attagenus bifasciatus, Ol., has been taken in the open but is a possible pest of stored materials.

Trogoderma versicolor, Creutz., is a pest of stored grain.

CLERIDÆ:

Trichodes laminatus, Chev. var. *cyprius*, Reitt., *T. laminatus*, has been recorded as attacking, in its larval stage, eggs of the locust *Dociostaurus maroccanus*, in Iraq. This habit has not been observed in Cyprus.

Other species of *Trichodes* not recorded from Cyprus have been recorded as destroying eggs of this locust in Turkestan, Algeria and Spain.

ANOBIIDÆ:

Lasioderma serricorne, F. (Tobacco Beetle), a pest of cured tobacco. Tobacco leaf is attacked and damaged while awaiting export and so also is imported leaf in the stores of the cigarette factories. Probably the most serious damage is that which occurs to the cigarettes after they have been packed and exported, the workings of the beetles and their larvæ causing holes in the paper of the cigarettes. Some precautions are taken in some of the factories and in one or two cases the cigarettes are fumigated with HCN before export. This insect has also been found damaging stored tobacco seed. Other stored materials are also attacked, but grain is not usually attacked except after long storage.

PTINIDÆ:

Ptinus fur, L., a pest of books, woollen goods, skins, etc.

BOSTRYCHIDÆ:

Schistoceros bimaculatus, Ol.—Taken boring in twig of apple, recorded elsewhere (Daghistan) as a vine pest.

Rhizopertha dominica, F.—Found damaging stored barley.

BUPRESTIDÆ:

Ptosima undecimmaculata, Hbst.—Borer in apricot trees and probably attacks other fruit trees and carob trees being recorded on the latter in Malta and Italy. Other species belonging to this family also occur and are probably of similar habits but no damage caused by them has been recorded.

Agrilus roscidus, Ksw., bred from apple trunk.

Sphenoptera tappesi, Mars., bred from peach trunk.

ELATERIDÆ.—No damage by "wireworms" has been recorded in Cyprus and they have not been observed in any numbers, although adults of some four species have been taken, of which *Melanotus fusciceps*, Gyll, var., might be injurious.

TENEBRIONIDÆ.—Larvæ of this family, some of which are very similar in appearance to the true "wireworms" have once or twice been found in circumstances which suggested that they were causing damage, such as in the stem of a potato plant, in the soil about the roots of potatoes or inside the stem and roots of melon plants, but no serious damage to crops has been caused.

Several species occur which belong to genera other species of which have been recorded elsewhere as causing damage to crops, but no damage has been recorded as due to the species occurring in Cyprus.

Opatroides punctulatus, Brull., causes damage to young tobacco plants by eating the stems at or just below ground level.

Zophosis punctata, Brull., occurs in company with the above species and apparently causing similar damage.

Gonocephalum rusticum, Olive., also occurs commonly and may cause similar damage.

Hypophlœus fraxini, Kugel., bred from pine logs with *Ips erosus*, Woll. and *Myelophilus piniperda*, L.—This species probably feeds only on fungi in the galleries made by the other species.

Tribolium castaneum, Hbst.—A pest of stored grain, flour, etc., also recorded from cotton bolls.

Tribolium confusum, Duv.—A pest of stored grain, flour, bran, etc. This species is probably more abundant than the preceding and occurs in grain stores very commonly. It has also been taken under bark of trees.

CISTELLIDÆ:

Omophlus propagatus, Kirsch.—This species occurs abundantly in several parts of Cyprus. In corn fields it does not appear to cause injury, but it damages the flower buds and flowers of olives and also attacks the flower buds of vines. The most serious damage caused by it has been observed on vines which in one area suffered severely in 1932 from its attacks, the vines being almost completely stripped of flower buds.

Omophlus curvipes, Brull., has been seen occurring in large numbers on trees, etc., but no damage has been recorded.

BRUCHIDÆ:

Bruchus dentipes, Bdi., is a common pest of broad beans and peas.

Bruchus lentis, Fröb. and *B. chinensis*, L., are recorded from lentils, *B. rufimanus*, Boh., from broad beans and *B. analis*, F., from peas.

Pseudopachymerus lallemanti, Mars., has been recorded in seeds of the ornamental *Acacia farnesiana*.

Spermophagus sericeus, Geoff., has been recorded only on flowers of leek in the open.

CRIOCERIDÆ :

Crioceris bicruciata, Sahlb. (Asparagus Beetle).—Recorded on cultivated asparagus which, however, is little grown, but *Asparagus acutifolius*, L., and *A. stipularis*, Forsk., occur commonly.

Lema melanopa, L., causes a certain amount of damage to the leaves of cereals in spring, but no case of severe or widespread damage has been recorded.

CLYTRIDÆ :

Clytra nigrocincta, Lac. var.—Recorded as occurring in numbers on turpentine tree (*Pistacia* sp.) and damaging young leaves and shoots.

Clytra atraphaxides, Pall.—Reported as eating almond leaves.

Gynandrophthalma limbata, Stev.—Recorded as causing considerable damage to almond trees by destroying the flowers and young leaves.

Rhaphidopalpa (*Aulacophora*) *foveicollis*, Küst., causes damage to melons and other cucurbits in most areas where they are grown. The adult insects hibernate and appear in spring when the melon plants are young, causing damage by eating the leaves, the damage being particularly severe when the plants are attacked at the cotyledon stage as the crop may then be completely destroyed and re-sowing necessitated. Eggs are laid in the soil near the plants and the larvæ live in the soil and feed on the roots. Pupation occurs in the soil and there are probably three or four generations during the summer.

HALTICIDÆ (Flea Beetles) :

Haltica ciliciensis, Weise.—Damage by this insect to the leaves of imported "American blackberry" has been recorded in the southern mountains, where also this species has been found abundantly on wild blackberry.

Aphthona æneomicans, All., occurs in large numbers on the leaves of walnut, hazel, etc., but has not been recorded as causing damage.

Aphthona euphorbiæ, Schrank., causes considerable damage to young flax at times and has also been found in large numbers on olive and cherry trees but no damage to these trees or neighbouring crops was observed.

Longitarsus parvulus, Payk., occurs on flax in company with the preceding species but apparently in smaller numbers.

Phyllotreta cruciferæ, Gœze.—Recorded as causing damage to cauliflowers, but not usually destructive.

Phyllotreta corrugata, Rche.—Sometimes causes severe damage to stocks and wallflowers, young plants being completely destroyed.

Several other species of Halticidæ occur sometimes in considerable numbers, but no damage by them has been recorded.

Sphæroderma testaceum, F., is a minor pest of artichokes.

Podagrica malvæ, Ill.—This species is reported to feed on malvaceous plants and is an occasional pest of cotton elsewhere. It has once been found in Cyprus causing a good deal of damage to young orange leaves, and has also been found damaging *Hibiscus esculentus*, and artichokes.

CASSIDÆ:

Cassida ? palestina, Rch., occasionally causes damage to the foliage of artichokes.

Hypocassida subferrunginea, Schr., apparently an occasional pest of beet in Italy, occurs but has not been recorded as causing damage.

CERAMBYCIDÆ:

Cerambyx heros, Scop., has been recorded (in *Cyprus Agricultural Journal*, XVII, 1922, p. 28), as causing considerable damage to carob and walnut trees. The eggs are stated to be laid beneath the bark in July, or in crevices caused by faulty pruning. Larvæ penetrate the wood and feed for 3 or 4 years, pupating in the spring.

This species has not been recorded since 1922 and no specimens appear to have been preserved, so that the identification cannot be confirmed.

Cerambyx velutinus, Brull., occurs rather commonly, attacking fruit and other trees. This may be the species intended in the reference to *C. heros* referred to above.

Hylotrupes bajulus, L., occurs commonly in the woodwork of houses. This species appears to prefer dry coniferous wood and thus finds very suitable conditions, while the frequent cracking of woodwork during the dry summers gives ample opportunities for oviposition. This species is a pest in Northern Europe, particularly Denmark, Germany, Russia, and in Siberia. The larval stage is stated to last two years or longer in Denmark and Russia.

Chlorophorus varius, Mull., has been bred from the trunk of fruit trees and the adults are seen fairly commonly.

Other species which occur are *Leptura revistata*, L., *Stromatium unicolor*, Ol. (taken on olive-tree) and *Purpuricenus budensis*, Gotz. The latter was taken in bait pans containing molasses hung in apple trees to capture *Cydia pomonella*. No records of damage caused by these species have been obtained.

LAMIIDÆ:

Niphona picticornis, Muls., bred from trunk of pomegranate.

Pogonochærus perroudi, Muls., bred from pine logs but possibly only dead trees are attacked.

Agapanthia carduri, L.—Adults found fairly commonly on flowers, especially of thistles. This species is stated to be a pest of artichokes in Malta but has not been recorded as causing damage in Cyprus.

Agapanthia dahli, Richt., has not been recorded as injurious in Cyprus but is a pest of sunflowers in Southern Russia. Sunflowers are not grown as a crop in Cyprus.

PRIONIDÆ:

Rhesus serricollis, Mors., occurs fairly commonly. A number of larvæ from which adults of this species were reared were found to have very considerably damaged the trunk of a large plane tree at Nicosia, which was broken off in a gale.

CURCULIONIDÆ (Weevils):

Anthonomus pomorum, L. (Apple Blossom Weevil), occurs on apples and pears and is a serious pest in some localities. The larvæ live in the unopened blossoms which they destroy, the petals turning brown and the whole blossom eventually falling from the tree.

Anthonomus cyprius, Marshall, causes damage similar to that caused by the preceding species, to peaches and almonds.

Apion semivittatum, Gyl., *A. viciæ*, Payk., *A. vorax*, Hbst., and *A. radiolus*, Kirby., have been found together in considerable numbers on walnut trees, but no appreciable damage has been recorded. *Apion radiolus*, Kby., and *A. æneum*, F., have been found similarly on almond and cherry trees.

Baris timida, Rossi.—Adults taken on wild malvaceous plants in spring and in tunnels in roots of hollyhocks in winter. It appears that this species might attack cotton but no such attack has been observed.

Brachycerus sp., occurs and species of this genus cause damage to garlic and to other bulbs in Italy and elsewhere but have not been recorded as injurious in Cyprus.

Calandra granaria, L. (Grain Weevil).—A common pest of stored grain.

Calandra oryzæ, L.—A common pest of stored grain.

Calandra sculpturata, Gyl.—Intercepted at a port in seed of *Eugenia jambolana* from Tanganyika Territory.

Chiloneus brevithorax, Desbr., taken feeding on leaves of citrus.

Hypera variabilis, Hbst., a pest of lucerne and cotton elsewhere, occurs in Cyprus but has not been recorded as causing damage.

Lixus lutescens, Cap.—Once taken on artichokes causing slight damage.

Lixus ascanii, L.—Adults taken on wild cruciferæ and a possible minor pest of cabbages, etc.

Lixus algirus, L.—Adults taken while eating the leaves of almond, peach and orange trees, and ovipositing in stem of mallow.

Larvæ of *Lixus* sp., are frequently found in the stems of broad beans, attacked plants being stunted and unhealthy.

Pachytychius hordei, Brulle, has been recorded from wheat sheaves, but does not appear to have caused appreciable damage.

Psalidium aurigerum, Desbr., has been once recorded in the adult state as damaging the buds of newly-planted vine cuttings.

Rhynchitis ruber, Fairm., (Olive Weevil), causes damage to the leaves, shoots and fruit of olives, particularly in some areas near Morphou. The adults appear in April and May and feed at first on the young leaves and shoots and later attack the fruit as it commences to form. They cut through the epidermis and eat the flesh beneath, this damage later healing but leaving a hard discoloured patch and causing the fruit to be misshapen, particularly when several such patches occur on a fruit. Eggs are laid in holes from which the adults have fed and the larvæ on hatching burrow directly into the stone, which is still soft at that time. The larvæ are full grown shortly before the olives are ripe, in September or October, and bore through the stone and flesh and pupate in the ground. There is only a single generation in the year and only a single larva develops in a fruit.

Sibinia planiuscula, Desbr.—Once recorded in numbers on cotton bolls near Larnaca, but not subsequently found in that locality.

Sitona oculata, Küst.—Damaging leaves of spinach-beet.

Sitona lineata, L. and

Sitona limosa, Rossi.—These species frequently cause a certain amount of damage to the leaves of broad beans.

SCOLYTIDÆ (Bark Beetles):

Coccotrypes dactyliperda, F.—Taken in date stones.

Phlœosinus armatus, Reitt., occasionally causes damage to cypress trees, but is not found in great numbers.

Scolytus rugulosus, Ratz.—Taken mining in twigs of cherry, loquat and other fruit trees. This species attacks various kinds of fruit trees elsewhere.

Scolytus amygdali, Guer., is considerably more abundant than *S. rugulosus* and has been taken on plum, apricot, apple and almond trees and probably also attacks other related trees.

Phlœotribus oleœ, F. and

Phlœotribus caucasicus, Reitt.—These two species are common pests of the olive tree, to which they frequently cause serious damage. The adults attack the young twigs before tunnelling into the branches where they oviposit.

Ips (*Pityogenes*) *porifrons*, Eggers.—Recorded from *Pinus halepensis*.

Ips erosus, Woll., has been bred from pine logs.

Myelophilus piniperda, L., occurs commonly and causes damage to the young shoots and trunks of pine trees.

CETONIIDÆ:

Epicometis hirta, Poda, and

Oxythyrea abigail, Rche., occur commonly on flowers in the spring and are sometimes troublesome in gardens, and also damage young wheat ears and young almonds. The former is also recorded as damaging orange blossom and vine leaves and as causing a considerable amount of damage, in its larval state, to seedling trees in nurseries.

Protœtia cuprea, F., recorded as attacking pear fruit.

Protœtia œruginosa, Drury.—Taken in bait pans containing sugar hung in apple trees.

Protœtia libanii, G. and P., taken damaging a species of thistle.

DYNASTIDÆ:

Oryctes nasicornis, L., var. *gryphus*, Ill.—Newly emerged adults still in pupal cell taken in soil beside decaying roots of apricot tree.

Temnorhynchus baal, Rch., has been taken tunnelling into water melon.

MELOLONTHIDÆ:

Anoxia meridionalis, Rtt., and

Haplidia fissa, Burm.—These two leaf-eating species occur but have not been associated with any particular plant.

RUTELLIDÆ:

Adoretus pullus, Baudi, frequently occurs in numbers and causes damage by eating the leaves of pear, almond, rose and other trees.

[*To be continued in the December issue.*]

A Study of Colocasia.

(*Colocasia antiquorum* Schott.)

BY STANLEY G. WILLIMOTT, Ph.D. (Cantab.), etc., *Government Analyst.*

PART I.—ORIGIN AND AGRICULTURE.

COLOCASIA, or taro, is one of the most valuable as well as one of the most ancient food plants of man and different varieties are still in cultivation over a region extending from New Zealand up to the line of Cyprus and the Dodecanese in the Mediterranean, and from the West Indies to China. It grows only where it has been taken by the hand of man, since it is believed to seed no longer, and thus furnishes evidence of his migrations. But as soon as man ceases to cultivate it year by year from the tubers it flourishes no longer.

Nomenclature and History.

Like other widely distributed food plants it is known under many names; consequently there is much confusion in its nomenclature. It is a species of the genus Arum belonging to the natural order of Araceæ. But many plants formerly referred to Arum are now placed under other genera, while numerous plants of other genera are popularly called arums, as for example, the water-arum and the arum-lily. About a dozen species are found in Europe and the Mediterranean littoral and in Cyprus the genus is represented by some six or seven species, determined by earlier botanists, and listed in Jens Holmboe's classical monograph (1). Here the cultivated plant is given as *Colocasia antiquorum* Schott, for which the terms *Arum Colocasia* L., *Arum esculentum* and *Caladium colocasia* are presumably synonymous; it is a variety of, or certainly closely identified with, *Colocasia esculenta*. According to Barrett,(2) no less than 300 distinct varieties are known.

The plant and its varieties goes by no less a number of popular names in different parts of the world where it is grown as a food-plant. In English it is known as taro—its native name in Polynesia—or colocasia, and sometimes as elephant ear. In America it is the dasheen; in China bun-long-woo; in Egypt the kolkas, and to the Greeks of the Mediterranean, colocasi. In Jamaica the name in general use is the very confusing term "cocoes" but in other parts of the West Indies the plant is known as "eddoes" and "tanias," the latter having several different spellings. The term tania, however, seems to be in general use throughout the West Indies and South America (11).

The cultivated plant is considered to be a native of India but it has been known in Egypt from time immemorial and is referred to by Pliny as *Arum ægyptum* (3). As might be expected references to the plant are not lacking in ancient literature. It is mentioned in Chinese writings of 100 B.C. and by Dioscorides, but European botanists gained their knowledge of the plant from Egypt. Lusignan (4) makes the first reference to Colocasia antiquorum in Cyprus in 1573, but its cultivation in the Island is of much earlier date. According to Oberhummer,(4) however, the plant may be seen represented in the design of capitals of buildings dating from the 13th and 14th centuries.

Wild Colocasia.

As already indicated Holmboe (1) describes several other species growing wild and known to the villager as ἀρκοκολοκάσι, or wild colocasi. They are sometimes confused with γλυκοκολοκάσι or Jerusalem artichoke (*Helianthus tuberosus* L.), which contain no starch and also cultivated on a small scale in the Island and from which, of course, they are distinct. The true sweet potato (*Ipomœa batatas N.O. Convolvulaceæ*) is not a field crop here. The most common of the wild arums found in Cyprus are :—

A. hygrophilum : Requires a habitat of damp, shady places, such as in the cotton fields about Kythrea. It is found almost everywhere when the above conditions are present and is common on the plain and foothills.

A. oriental var., gratum : Cultivated fields around Kythrea.

A. Dioscoridis : Can flourish under drier conditions and is found commonly almost everywhere on the plain, especially in the eastern part, in ditches and hedgerows. It is found plentifully about Ayia Napa, for example, along the Kyrenia coast and in the Castle of St. Hilarion.

Arisarum sp.: Two varieties have been observed on the Troödos range ; the flowering spike of red berries appears in late autumn (October and November).

Most of the above species thus occur more commonly in the Island than has previously been supposed (*cf.* Holmboe (1)). With the exception of Arisarum, these species flourish during spring and early summer and are conspicuous by their characteristic spike of green berries turning to red when the rest of the plant has withered. Apart from their botanical interest these species of wild colocasia are of importance because in time of drought and bad seasons villagers prepare a fecula from the underground tubers by drying them in ovens and grinding. This flour they then bake into bread. All arums appear to contain an acrid substance, less perhaps in the cultivated tuber, which is readily dissipated by the heat of drying.

Toxicity.

A sixth and poisonous species, again occurring in a damp and shady habitat, has been found near the monastery of St. Neophytos, Paphos, and I am indebted to Mr. G. Frangos, late Government Inspector of School Gardens, for bringing this interesting species to my knowledge. The distinguishing features are : the stem, which is mottled with purple black spots ; the long pointed spike about 4–5 times the length of that of the ordinary arum ; and the offensive smell of the poisonous red berries. The leaf has a strong caustic taste and may cause excoriation ; it is also poisonous. From these characteristics there would appear to be ilttle doubt that the plant in question is *Arum maculatum*, or a close variety of it and known here as Δρακοντια. So far as the author is aware it has not previously been recorded for Cyprus. *Arum maculatum* is a common plant in England and goes by the popular names of " lords and ladies," " cuckoo-pint," etc.(5) It puts up its leaves and spathe in early spring, the leaves being glossy and spotted. The poisonous character of the succulent red berries and the leaves has long been

recognized. Starch, in the form of an arrowroot, was formerly extracted from the tubers, which after heating is innocuous. The product from this source is spoken of as Portland arrowroot, since this species of arum was formerly much cultivated in the Isle of Portland. It is perhaps noteworthy that the starch has been sold in Paris as a cosmetic under the name *poudre de Chypre* (6).

Feeding Experiments.

It was hoped to obtain data on the toxicity of the leaves of cultivated and wild colocasia but this was not possible as the experimental animals refused to ingest them. In these experiments fresh young leaves of *Colocasia antiquorum* were offered to groups of young albino rats, rabbits and guinea pigs. The leaves were simply washed and given whole before the morning ration of basal diet. The rabbits tried a little of the stalk but discarded it quickly on discovering its causticity; only the rat succeeded in ingesting a little leaf tissue and from its resulting behaviour evidently suffered considerable irritation when the causticity developed. The writer and L.C.H. also ingested some of the fresh leaf tissue with the result that the taste was first found to be not unpleasant but after one or two minutes a most unpleasant sensation of tingling and burning of the mucous membranes of the tongue and mouth developed, for which washing out with water was without effect. Gradually the sensation passed off. Similar results were obtained in animal experiments with the fresh leaves of *A. Dioscoridis*. Domestic animals in Cyprus rarely eat the foliage of wild or cultivated arums, the only exception to this being the pig, which apparently can ingest the dry leaves of the cultivated plant but with a definite preference for the stalk tissue. This is quite distinct from the use of potato plants as feed for animals as it is the general practice in Cyprus to feed sheep, goats and sometimes oxen on potato plants which have commenced to wither. Potato plants have even been used as human food in years of drought in the Island (Willimott).(7)

The irritation experienced with all species of arum was long ago attributed to the presence of crystals of calcium oxalate (raphides) in the plant cells of members of this family. Pedler and Warden,(8) who were the first to describe this phenomenon, believed that the unpleasant effects were explained by physical contact with the needle-like crystals. Safford,(9) however, in 1905 was able to show that the irritation was chiefly due to the force exerted when the crystals were ejected from their capsules in the presence of water; and Black (10) in 1918 demonstrated that the capsules lost their ability to expel crystals after the plant had been cooked or dried. In the light of these facts the results of the feeding experiments described above are explained but the question as to whether species of arum (*e.g.* maculatum) contain, in addition to the calcium oxalate, some other organic poison of unknown chemical composition, would appear to warrant further investigation.

Although in Cyprus the principal use of colocasia leaves is for manure, elsewhere, as for example in Jamaica (11) and the Island of Guam, (9) the young green leaves are boiled and eaten as spinach while the mature leaves and stalks are said to make excellent fodder for cattle and pigs. Taro shoots and taro stalks are now produced in Hawaii as table vegetables and their nutritive constituents and mineral elements have been

investigated (12). It is noteworthy that in the past the leaves of colocasia grown in Egypt, as also those of the banana, have been used to adulterate tobacco.(13) In tropical countries colocasia is often sown as a shade plant for crops such as young cacao or spice, but this expedient is not used in local agriculture. However, fields and plots of colocasia are frequently to be found hedged round with maize while between the rows cucumber, tomato, or marrow are often planted as a catch crop. The reason for this is the high cost of production of colocasia and so the Cypriot farmer tries to obtain something in addition for his expenditure of manure, water and labour.

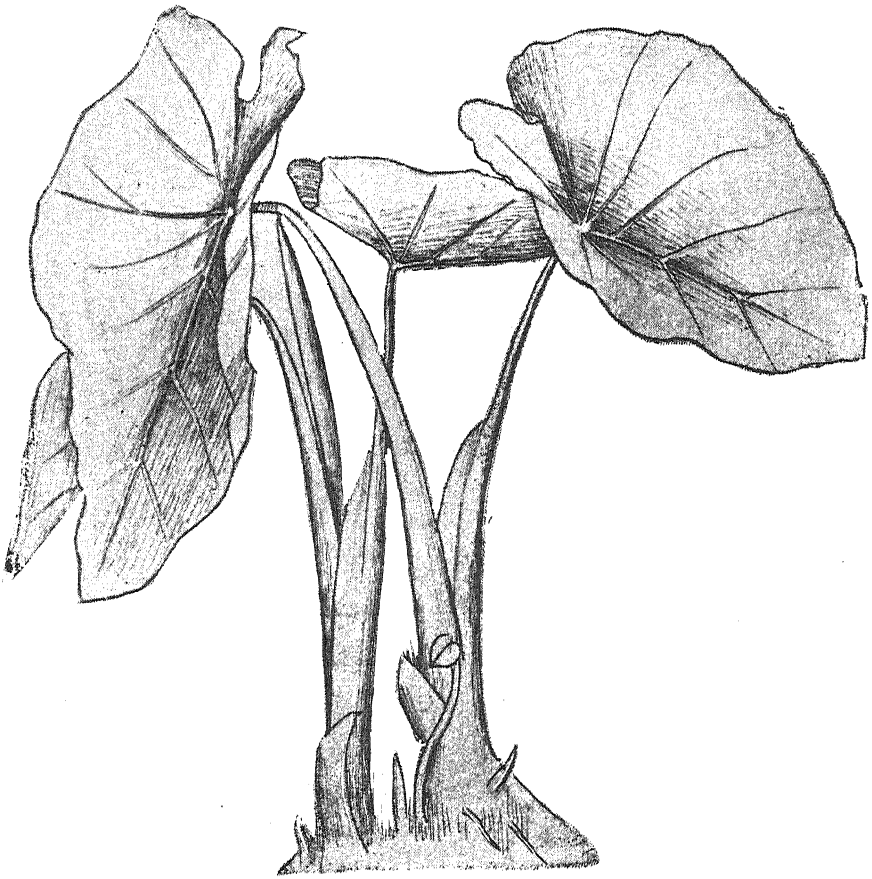


Fig. 1.—Colocasia antiquorum Schott.

The Cultivated Plant.

As a field crop colocasia is indeed one of the most striking by reason of its stately, dark green foliage ; in fact varieties of the plant in Europe are grown solely for their handsome ornamental effect, as for instance, in the Luxembourg Gardens, Paris,

The plant has no true stem ; the large, graceful, heart-shaped leaves, which may reach any height up to seven feet, being borne on long petioles or foot-stalks rising from the ground. It is a monocotyledon but forms an exception in having its leaves net-veined as in the case of a typical dicotyledon. The inflorescence is noteworthy since it exhibits male flowers on the upper part of the spike and female flowers below ; in neither case are sepals or petals found. Under conditions of cultivation the plant does not always flower. Fortunately up to the present the crop in Cyprus has been free from disease of any kind.(14) The tuberous rhizomes are not usually more than six inches in diameter, excluding the very small tubers used for seed, and found adhering to the parent body.

Varieties and Production.

Two local varieties are recognized and cultivated, viz. Karpas and Morphou, of which the latter is more esteemed because of its sweetness, flavour and lighter colour. Consequently it commands a higher price in the local markets. The Morphou tubers are longer in shape and of somewhat lighter colour than those of the Karpas which are more spherical. In both varieties the outer skin is roughly marked with rings of dark-brown scales. The production centres round the village of Ayios Andronikos in the Karpas and round Lapithos in Kyrenia District and the cultivation would appear to be spreading. The crop, of whichever type, is entirely for local consumption as there is no export trade. Its chief, and more important competitor, is the potato, and in Table 1 (15) the annual production of colocasia is compared with that of the potato over the last five years. From these data it appears that the acreage under colocasia remains fairly constant while the yield, possibly as a result of better cultivation, shows a small increase. It cannot, of course, rank with the potato crop, largely produced for export, and now well established in local agriculture. [*vide* (7)]

TABLE 1.—ANNUAL PRODUCTION OF TUBERS.

	Colocasia		*Potatoes*	
Year	*Area acres*	*Gross Yield okes*	*Area acres*	*Gross Yield okes*
1931	371	1,088,838	5,814	16,102,320
1932	273	802,106	6,451	17,714,571
1933	241	846,463	4,239	12,087,707
1934	282½	967,029	5,263	15,088,005
1935	277	1,233,597	6,165	17,325,689

Cyprus oke = 2.8 lb.
800 okes = 1 ton.

Cultivation.

A deep or sandy loam with plenty of organic matter in it suits colocasia best and to this end the land is well manured with old stable manure about a month before planting. The crop does not do well on very sandy or clayey soils. Given an abundance of moisture and heat, as in a tropical climate, the plant flourishes and can stand great extremes of heat and humidity. As already stated, the major crop is found in the Districts of Morphou and Karpas but, as will be seen from Table 2, (15) there is a small

production for local needs in each administrative district. The crop is raised on a four-year rotation of colocasia, cumin, fallow, wheat. To obtain the best results the cultivation requires some experience and care (*cf.*[11]). First, a suitable piece of land is chosen, which must be level, and this is given three or more deep ploughings: the first usually in October, the second in December, and the third or fourth just before the time of planting in March or April. The plants are propagated from the very small tubers reserved for this purpose. The system in Cyprus is to prepare the land for sowing by heaping up the soil so as to form a series of symmetrically winding ridges and troughs. The purpose of this is to allow the irrigation water to stand in the troughs between the ridges for the longest time possible and thus explains the necessity of choosing a level planting ground. Drills are then made in the troughs to a depth of about six inches to receive the seed-tubers, which are planted in rows of three foot interval and with a distance of about one foot between individual plants.

TABLE 2.—PRODUCTION OF COLOCASIA BY DISTRICT.

	1934		1935	
	Acres	*Okes*	*Acres*	*Okes*
Nicosia (Morphou)	94	211,945	32	273,935
Famagusta (Karpas)	134	614,674	152	685,952
Larnaca	0½	1,000	3	14,500
Limassol	1	1,306	5	8,900
Paphos	19	23,812	36	51,490
Kyrenia (Lapithos)	34	114,292	49	198,820
Total	282½	967,029	277	1,233,597

After planting the crop is immediately irrigated with sufficient water to allow it to stand between the winding ridges at a depth of about six inches. Ample irrigation and a good tilth are essential for the cultivation. Throughout April and May the crop must be irrigated every 8 days, in June and July every 4 days, and in August at least every second day. At this period it is preferable to irrigate at night or before sunrise. During September irrigation is carried out every 4 days and every 8 days in October, in which month it ceases. With a crop such as this, requiring a liberal water supply, it is essential that weeds should be kept down by systematic hoeing and earthing-up. The first hoeing is given a month after planting; the second, with good earthing-up, in July; and a final treatment as required, during which the bottom leaves are removed. The crop is ready for lifting from October onwards to January and there is the advantage that the tubers may be left to remain in the ground without deterioration for a considerable time after they are ripe. The crop is thus dug up as and when required for market. The tubers are then sorted into three categories according to size and shape, viz: (*a*) large, oval tubers weighing ½–1 oke; (*b*) long, narrow tubers weighing ¼–½ oke; (*c*) small, round tubers for seed kept in an earth hole until required. The average retail price during 1935 was 1½ piastres per oke for Karpas colocasia, and 2 piastres for Morphou, compared with 1½ piastres for potatoes.

PART II.—COMPOSITION AND NUTRITION.

Yield and Cost.

It is noteworthy that this is the most expensive annual crop of any kind to produce in Cyprus and in this connection the comparative data in Table 3 are instructive. The yield of colocasia per Government donum ranges between 2,500 and 4,000 okes, with an average of about 3,000 okes, as compared with a yield for potatoes ranging between 1,500 and 3,000 okes per donum, with an average of about 2,000 okes. Thus an average crop of colocasia may be reckoned to yield approximately a 50 per cent. higher return than its chief competitor, the potato.

TABLE 3.—APPROXIMATE COST OF PRODUCTION OF SOME STAPLE CROPS IN CYPRUS.

Crop	*Cost per donum in £ sterling*			
	£	*s.*	*cp.*	
Colocasia..	15	0	0	
Potato	£3—4	0	0	
Wheat	–	15	0	
Barley	–	10	0	
Oats..	–	7	0	
Broad beans	1	10	0	
Vetches	–	4	0	
Favetta	–	5	0	
Cowpeas	2	3	0	
Water melon	4	0	0	
Cumin	2	0	0	
Linseed	2	10	0	
Sesame	1	7	0	
Onion	1	5	0	
Cotton	3	5	0	
Tobacco	2	0	0	
Citrus	5	0	0	(after trees come into bearing.)

The figures in this table are based on the cost of production at the Experimental Farm, Morphou, and are higher than those of the average Cypriot farmer, who has no labour charges to meet.

One Government donum = $\frac{1}{4}$ acre approximately.

Chemical Composition.

Carbohydrate, mostly in the form of starch, is of course the chief constituent and renders it the valuable energy food which is much esteemed by the Cypriot. In Table 4 are summarized analytical data on the composition of both types of local colocasia, which do not appear to have been analysed in full previously. An American analysis by Blasdale, [16] and another, for the purpose of comparison on the potato, by Plimmer [17] are also included. The analyses were made in duplicate on fresh, raw, whole tubers after they had been washed; Plimmer's analysis is on the cleaned raw tubers. The tubers are used as vegetables like potatoes and when boiled with a liberal addition of lemon juice, change to a distinct creamy colour and develop a rather sweet and pleasant flavour. It is eaten with boiled meat dishes, especially in winter when it is at its best, but the tubers can also be made into a nutritious soup. Throughout the tropics they are a staple food of the indigenous classes but are appreciated also by Europeans who have acquired a taste for them.

TABLE 4.—CHEMICAL COMPOSITION OF COLOCASIA AND POTATO.

	Large Tubers			
	Morphou	*Karpas*	*U.S.A.* (*Blasdale*)	*Potato*, (*Plimmer*)
	%	%	%	%
Water	75.7	78.6	74.20	76.1
Ash	1.5	1.4	1.31	1.7
Fibre	0.8	0.7	0.98	1.1
Protein (N×5.68)	1.9	1.8	1.70	2.1
Starch (by difference)	16.1	13.7	17.95	19.0
Sugar	3.8	3.6	1.15	—
Fat	0.2	0.2	0.27	0.05
Total	100.0	100.0	97.56	100.05
Energy value, Calories, per 100 grams	91.2	80.2	87.8	87.0

The ash, like that of most root vegetables, is of alkaline reaction. The fat and fibre are almost negligible. The protein is of albuminoid character but the nitrogenous matter is also made up of non-protein nitrogen. Contrary to experience with the potato, older tubers of colocasia were found to yield on analysis higher figures for total nitrogen than fresh young tubers. The most important constituent, the carbohydrate, consists chiefly of starch with a little reducing sugar. A specimen of the starch was extracted for examination by the usual process of finely rasping the clean tubers, washing out the starch granules, purifying by agitation with clean water, settlement of the granules, decantation, and slow drying in the air.

Poi.

The most important preparation of colocasia, or taro, is the fermented food, known in the islands of the Pacific as *poi*, and which appears to be a product peculiar to Polynesia. In any case, although colocasia is an economic crop in the littoral of the Levant, a preparation such as poi is unknown in Cyprus and, according to Borg,[18] in Malta also. But to the native Hawaiian poi is, in fact, "the staff of life" and his cultivation of the taro crop is largely for that purpose. Although not used to the same extent as formerly, it is still a staple food of the native Hawaiian and its manufacture is controlled by law [19]. In the Sandwich Islands (Hawaii) its use is of great antiquity and the earliest known reference to taro and poi, in modern times, is that of Captain Cook (1784), [20] who not inaptly described the latter as "a disagreeable mess from its sourness, greedily devoured by the natives."

The manufacture of poi [19] consists simply of two processes: (1) the cooking, peeling, and grinding of the taro corms; (2) the incubation and fermentation with water of the crushed product. European writers do not always appreciate the fact that the taro is first well cooked. Three kinds of poi are thus produced, depending upon the amount of water to be added, and known respectively as one, two, or three-finger poi. Allen and Allen,[19] who studied the question of taro culture in Hawaii, described the processes of poi-making in detail especially from the bacteriological standpoint. These authors showed that the acid fermentation is due primarily to bacteria, and secondly to yeasts, by inoculation from the original corms. They drew the important conclusion from their work

that the fermentation of poi bears a close analogy, in the types of organism concerned and the products of fermentation, to the souring of milk. Lactic acid, *inter alia*, was the predominating organic acid found. These authors also plotted the development of pH values with time, in the case of raw taro corms (pH 6.6), cooked taro (pH 6.37), and the resulting poi.

Specimens of poi were prepared in this laboratory from Morphou tubers by simply washing and grinding and allowing the paste to ferment. Changes were observed in odour, taste, consistence, and colour ; the odour was unpleasant and the colour a shade of lavender. Lactic acid was found to be the chief product of fermentation but other fatty acids such as acetic were also present.

Many observers have attributed the magnificent physique of the native Hawaiian to the fact that poi was the staple food. Since the resemblance of poi with *yoghourt* (soured milk) is a close one, it is not surprising that poi has long enjoyed a wide reputation in nutrition and therapeutics. Apart from its use as a staple food poi has been employed successfully in different gastric disturbances and intestinal conditions. Its usefulness would seem to be explained by the fact of its complete digestibility and absorption.

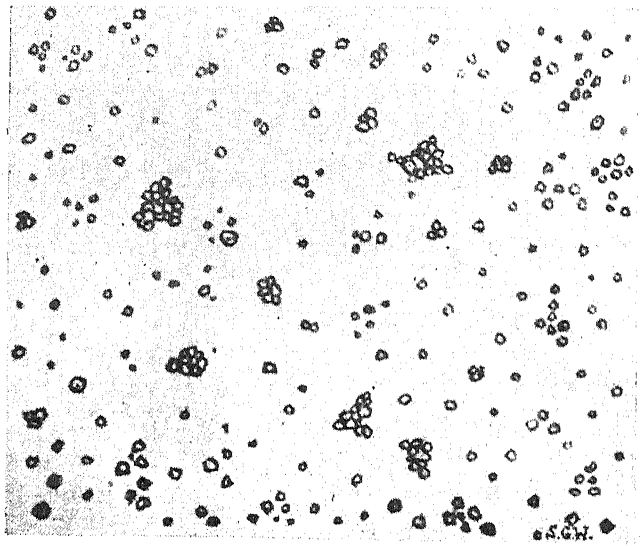


Fig. 2.—Starch of C. antiquorum or taro.

The Starch.

Microscopic examination was made side by side with other known starches with the result that the granule of colocasia was found to be as small as that of any other known starch. These observations are being published in detail elsewhere. In the literature dealing with starches there appears to be an almost complete neglect of the starch grains of taro or colocasia. It receives no mention, for example, in the detailed treatment of starch in two standard works such as Thorpe's *Dictionary of Applied Chemistry* and Allen's *Commercial Organic Analysis*. At 340 diameters the starch grains of taro, mounted in water, are just visible.

Under higher magnification (840 diameters), the larger grains appear definitely spheroidal or polygonal, with hilum central and minute, and appearing as a spot, with no rings visible. A typical microscopic field at this magnification is shown in Fig. 2. Both individual and compound granules were observed, the former frequently being in motion and the latter disintegrating in part into simple granules on mechanically manipulating the cover slip.

The microscopic appearance of the field was suggestive of pepper starch rather than of rice, both of which exhibit very small granules and are grouped together in Class V according to Muter's classification of starches. The size of the starch granules of colocasia was found to vary between 1 and 5 μ. Irrigation with dilute iodine solution gave the characteristic effect.

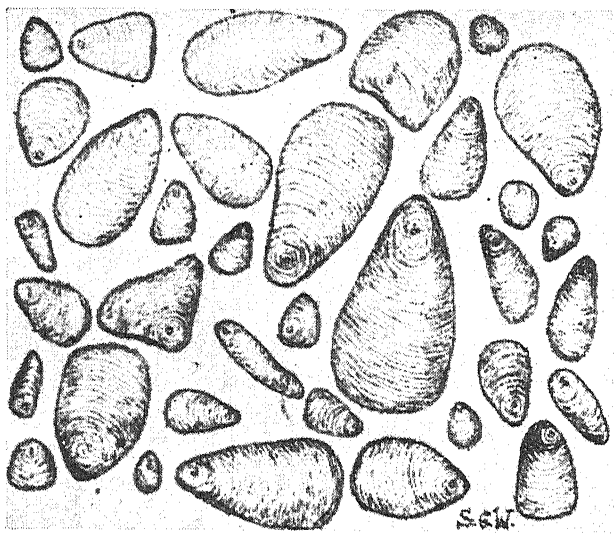


Fig. 3.—Starch of Canna edulis or Tous les Mois.

The granules of *Colocasia antiquorum* Schott are then simply characterized by their shape and minuteness, and these are the only diagnostic characters. It is noteworthy that the starch granules of other species of the arum family are quite different from those of colocasia, although in the two species examined the starch exhibited no characteristic differences between themselves. Thus the starch of *A. hygrophilum* was suggestive of cassava starch, but smaller, the typical grains being rounded at one end and truncated at the other, with excentric hilum. It is noteworthy that varieties of Canna edulis (*Tous les Mois*) are grown all over the Island as a garden plant with attractive flowers ranging in shade from yellow to red. It seemed, therefore, worth while to examine specimens of this tuber starch by way of comparison. The typical ovate granules, rounded at one end, and more or less pointed at the other, near which is situated the circular hilum, are shown in Fig. 3, at a magnification of about 500. The striations are seen to be well-marked, fine, regular, and incomplete ; dilute alkali develops the hilum and rings.

These are the largest starch grains known so that in Figs. 2 and 3 we have examples of the largest and the smallest starch grains known, the former ranging from approximately 45 μ. to 130 μ. *Cf.* Allen (21). Langworthy and Deuel (22) have shown that the raw starch of the taro tuber is completely digestible when humans are employed in the experimental tests.

Gelatinization Points.

It is well known that when starch is brought into contact with hot water, the granules, owing to the absorption of water, swell up greatly, and at different temperatures varying according to the kind of starch examined, ultimately rupture forming the familiar viscous liquid known as "starch paste." The use of a crude starch or the presence of impurity raises the required temperature for complete gelatinization, or the gelatinization point, as it is known. The thermal action is progressive, the younger later-formed granules swell up and burst first while the older earlier-formed granules are the last to change. Although the gelatinization point has been suggested as a criterion for the recognition of the many different varieties of starch, owing to the difficulty of controlling the experimental conditions, the method is too uncertain to be reliable. For the purpose of comparison, however, the gelatinization points have been re-determined for the starch of colocasia, St. Vincent arrowroot, Tous les Mois, potato and maize, the remaining data being taken from Auden (23) (Table 5).

TABLE 5.—GELATINIZATION POINT OF DIFFERENT STARCHES.

Origin of Starch	*Temperature of Complete Gelatinization. Degree Cent.*
Colocasia Antiquorum, Schott	66
Arum maculatum	62.5
Arum esculentum	68.7
Maranta arundinacea (St. Vincent)	70
Canna edulis (Tous les Mois)	72
Potato	62.5
Maize	62.5
Wheat	67
Barley	62.5
Rice	61.2
Tapioca	68.7

Under ultra violet light the fresh-cut surface of colocasia exhibits scattered areas of a light sulphur yellow fluorescence which become canary yellow as the tuber progressively dries. Damaged tissue near the cortex gave a jade green fluorescence. The active constituent exciting the fluorescence has not been determined but it is not the starch.

Vitamins and Minerals.

Investigations on the vitamin content, principally by American workers, have shown that colocasia, or taro, cannot be regarded as a rich source of any of the vitamins (24). According to Miller(25), both taro and poi have a low content of vitamin A, rather more of the vitamin B complex, and are low in the antiscorbutic vitamin C and in vitamin D. They are rich in calcium.(12) Apart from this, there appears to be no very recent work on colocasia and a re-investigation of the vitamin content with the

quantitative methods now available would seem desirable. It is satisfactory to note that these problems are included in the research programme of the Hawaii Agricultural Experimental Station, Honolulu, which is the centre for taro research.

Acid and Alkaline Balance.

It has already been said that the ash of colocasia, in common with that of most other roots and tubers, vegetables, fruits and nuts, is of alkaline reaction. This is a fact of great importance in nutrition as will appear in the sequel. The cereals and proteins (which include meat, fish, game, eggs, etc.), on the other hand, yield an ash of acid reaction in digestion. Here it should be mentioned that the custom of referring to the ash or mineral matter of a food is misleading and incorrect ([26]). The ash of any foodstuff always consists of a mixture of the compounds of different elements, and each element has its own functions and significance in nutrition. It is thus well known that elements so closely related chemically as sodium and potassium, or for example, calcium and magnesium, are not only not interchangeable but are, in some of their functions, directly antagonistic in their action in the body. Hence the necessity of considering the relative, as well as the absolute, quantities of the different inorganic elements of the food.

One of the most significant of these relationships is that subsisting between the acid-forming and the base-forming elements because upon this depends very largely the state of neutrality of the body fluids. The normal reaction of human blood is faintly alkaline to litmus and varies within the narrow limits of pH 7 to pH 7.8. The normal processes of metabolism involve a continual production in the cells of " volatile " acids, such as CO_2, and "fixed" acids, such as H_2SO_4, which must be promptly disposed of or neutralized. The different mechanisms, whereby the body secures such neutralization and the maintenance of the state of neutrality of the tissues, have been well summarized by Professor Sherman ([26]):—

> " This neutralization is in fact effected, partly by the amphoteric proteins abundant in all body cells, partly by ammonia formed from the deaminization of proteins and amino acids, and notably by the ' buffer ' action of the mixtures of phosphates and carbonates together with hæmoglobin . . . . The blood possesses a number of buffers of which four require consideration from the point of view of this study : (1) the plasma proteins, which, like proteins generally, are amphoteric ; (2) carbonic acid and the carbonates, existing chiefly in the plasma ; (3) the phosphates, in both the plasma and the corpuscles ; (4) hæmoglobin and its compounds in the red corpuscles of the blood. All these except the last are as abundant and as important in the protoplasm as in the blood . . . . . Thus while the phosphates and carbonates of the blood and tissues serve for the immediate neutralization of acid without appreciable change in the normal reaction of the blood or tissue itself, yet when much strong acid such as the sulphuric acid from protein metabolism is neutralized in this way, there is apt to result an increased output of the base-forming elements, which if not made good by the intake must tend to diminish the ' reserve alkalinity ' or ' alkali reserve ' of the body."

Experiment has shown that foods having a basic reaction after burning in the body increase the alkali reserve as indicated by the increase in CO_2-tension of the alveolar (expired) air ; while conversely foods having an acid reaction through the lowered CO_2-tension of the alveolar air indicate a depletion of the alkali reserve. In the benefit to health generally resulting from a free use of foods such as fruits, vegetables, and milk products in the diet an important part may be claimed for the fact that these foods yield ash of alkaline reaction to the body.

Roots v. *Cereals.*

Starch, which is the chief natural energy food of man, is supplied from two main sources—roots and tubers (including stems, rhizomes, etc.), and seeds (cereals). As already stated the root starches generally have an alkaline reaction in nutrition and the cereal starches an acid reaction. Since the well-being of the body is so intimately dependant on the state of alkalinity of the blood and tissues, this fact supplies a strong argument in favour of the use of tuber starch, such as colocasia and potato, rather than of cereal starch in modern diets. As Ettie A. Hornibrook(27) has shown, native man appears to have relied on roots much more than cereals for his energy food and so cultivated the main starch roots such as taro, maranta, cassava, sweet potato, giant bracken-root, etc. Cereals, which have also formed part of human diets from the earliest times, were first germinated by the more developed native races, as in the making of native beers, before cooking and eating. As civilization advanced so the cultivation of the more valuable starch roots has declined in the course of thousands of years, until now civilized man relies mainly on wheat, barley, oast, rye, rice, and maize, with the potato and colocasia of merely secondary importance. Recently Jones (28) has advocated the use of taro and sweet potato in the diet in preference to the grain foods because of their excess alkalinity.

Digestion of Starch.

It is obvious that the germinated cereal starch of native man was in a quite different condition from that consumed by civilized man. From the point of view of digestion the essential characteristic of the raw starch cell, whether root or cereal, is the fine wall of cellulose with which it is surrounded and which must be broken down before the cell contents can become available for nutrition. The human digestive system cannot deal satisfactorily with raw starch so that in modern practice the starch is boiled and is thus more or less hydrated. But native man regarded this boiling or steaming as insufficient and he developed the ground oven, as in North America, Polynesia, and New Zealand. In these ovens the starch foods were first hydrated completely, under pressure, and as the wet heat changed to dry they were dextrinized in one continuous process. Details of the process are set out in Hornibook's paper and in Stewart's Journal (1828) (29) as it applies to taro and poi, but cannot be discussed here. With energy supplied in this form native populations were free from the digestive disorders of civilization. In fact as Barrett (2) observes, in the Kanaka language of poi-eating Polynesia, there is no word for indigestion. Poi was considered to be of great nutritive value not only to the healthy and robust, but also to infants and invalids, being readily digested and non-irritating.

In addition to aiding digestion, the dextrinization of starches makes them more palatable, as for example the extra sweetness of properly baked potatoes, because the changes involved produce sugar-like bodies. This principle is finding constantly extended applications: in food factories dealing with the preparation of energy foods, in the use of cooked maize as feed for farm animals, and in the animal experiments of the laboratory. In the latter case it has been found that dextrinization of the starchy matter of the synthetic diet has led to better growth and well-being of the animals concerned. On the other hand, it is general experience that, when the carbohydrate is supplied by raw starch, the animals become pot-bellied, exhibit a distended intestine often filled with gas, and poor muscular tone. The application of this knowledge to man seems justified and indicates that the consumption of improperly cooked starch is a factor in the production of the distended abdomen characteristic of civilized man, a condition strikingly absent when the condition of primitive man, fed on dextrinized starch foods, is considered.(27)

Nutrition and Public Health.

Only a cursory glance can be given, in conclusion, to this most important aspect of public health which everywhere continues to attract increasing attention. The great error in the modern diet of overloading it with cereal starch, and sometimes sugar as well, is typical again of the average Cypriot diet. It is not surprising, therefore, to find the physical condition, described in the previous paragraph, present on all sides. Apart from this imbalance between the energy and the protein there seems to be a considerable section of the rural population who through poverty are underfed and here the incidence of affections such as tuberculosis, influenza, eye diseases, infections, and debility is high. Attention to the dietetic needs of this section of the community might well lead to the amelioration of some local economic problems by increased production of foodstuffs by agriculture.

The absence of the dramatic deficiency diseases such as rickets, beri-beri, scurvy, and pellagra might lead to the view that all is well with the average Cypriot dietary, but a closer scrutiny of its make-up shows it to be faulty. This is not surprising in view of the fact that a country with as high a standard of life as the United Kingdom reckons that from 20 to 30 per cent. of her population are suffering from some form of mal-nutrition. No scientific dietary surveys in Cyprus have as yet been made so that exact data are lacking. But there can be no doubt that qualitative as well as quantitative deficiencies in Cypriot diets have played their part in the general low resistance to infection, especially to pneumococci, staphylococci and streptococci. Whether the diseases of heavy incidence such as diabetes, the anæmias, cancer, rheumatic affections, gastric and duodenal ulcer, etc., have a nidus in faulty nutrition remain fruitful problems for investigation.

Finally, it must be remembered that although good food products exist in Cyprus, the food of the majority is often badly conserved, and adulterated. There is at present little conception of the importance of well-balanced nutrition in relation to health and disease and the fundamental conclusions of the research of the last 30 years have hardly penetrated to the local professional or layman.(30) There is, therefore, great need for the extension of sound knowledge in the elementary matters

of food and nutrition and for active research on staple food products along well-planned lines. The present study of the staple energy-food, colocasia, has been undertaken by the Government Laboratory as an effort along these lines.

It is a pleasure to record my thanks to the Director of Medical Services for his interest and support in this investigation, to the Director of Agriculture for kindly affording me facilities, and to Mr. L. C. Haralambides, Assistant Analyst, for skilled assistance in the experimental work.

REFERENCES.

(1) Jens Holmboe : *Studies on the Vegetation of Cyprus*, Bergen, 1914, pp. 42, 43.
(2) Barrett : quoted from Allen and Allen, *The Tropical Crops*, New York, 1928.
(3) Tibbles : *Foods, their Origin, Composition and Manufacture*, London, 1912, p. 503.
(4) Oberhummer : *Die Insel Cypern*, I. München, 1903, p. 293.
(5) Taylor : *Principles and Practice of Medical Jurisprudence*, Vol. II, London, 1928, 8th Edition, p. 732.
(6) Thorpe : *Dictionary of Applied Chemistry*, Vol. I, London, 1927, p. 394.
(7) Willimott : *The Analyst*, 1933. **58.** 431.
(8) Pedler and Warden : quoted from Thorpe (6).
(9) Safford : *The Useful Plants of the Island of Guam*, Washington, 1905 : quoted from Allen and Allen (19).
(10) Black : *Amer. Journ. Bot.*, 1918. **5.** 447.
(11) Nicholls. *Tropical Agriculture*, Jamaica, 1911, p. 218.
(12) Chung and Ripperton : *Hawaii Agricultural Experiment Station, Bulletin* 60, 1929.
(13) Lucas : *Legal Chemistry, etc.*, London, 1920, p. 170.
(14) Nattrass : *Private Communication.*
(15) Cyprus Government *Blue Book*, 1931–35, Nicosia, Cyprus.
(16) Blasdale : quoted from Tibbles (3), p. 504.
(17) Plimmer : *Analyses and Energy Values of Foods*, London, 1921.
(18) Borg : *Descriptive Flora of the Maltese Islands*, Malta, 1927.
(19) Allen and Allen : *Hawaii Agricultural Experiment Station, Bulletin* 70, 1933.
(20) Captain Cook : *A Voyage to the Pacific Ocean*, ii, London, 1784, p. 235.
(21) Allen : *Commercial Organic Analysis*, Vol. I, London, 1924, pp. 518–23.
(22) Langworthy and Deuel : *Journ. Biol. Chem.*, 1922. **52.** 251.
(23) Auden : *Starch and Starch Products* London, 1922, p. 15.
(24) *Medical Research Council Special Report* 167 *on Vitamins*, London, 1932, p. 308.
(25) Miller : *Bishop Museum Bulletin* 37, 1927, quoted from Allen and Allen (19).
(26) Sherman : *Chemistry of Food and Nutrition*, 3rd. Ed , New York, 1931, p. 288 *seq.*
(27) Ettie A. Hornibrook : *Man's Energy Foods, New Health*, London, April, 1928.
(28) Jones : *Dental Cosmos :* April, 1934.
(29) Stewart : *Journal of a Residence in the Sandwich Islands*, London, 1828.
(30) Willimott : *Annual Report* of the Government Laboratory, Nicosia, 1932.

A Brief Review of Tree Planting in the 1935–36 Planting Season.

ALTHOUGH the number of trees planted in the Tree Planting Areas is considerably less than that of the previous season, trees planted in areas other than declared tree planting areas exceed the number planted in the 1934–35 season by over 200,000 trees. This indicates clearly that Cypriot farmers now realize the benefits to be derived from tree planting.

Since the enactment of the Licensing of Shepherds' Law tree planting has been done with more confidence than in the past and as the lawless shepherds are gradually brought under control, tree planting will steadily increase every year.

There were 51 areas declared under the Tree Planting Law during the planting season of 1935–36 which with the 47 previously declared areas brings the total reserved areas in the whole Island up to 98.

The existing tree planting areas in each district are given below :—

TREE PLANTING VILLAGE AREAS LAWS, 1930–36.

Nicosia District.

1. Vizakia
2. Orounda
3. Kato Kopia
4. Akacha
5. Arghaki.
6. Peristerona.
7. Mitsero.
8. Episkopio.
9. Platanistasa.
10. Morphou.
11. Paleokhorio.
12. Pera.
13. Dhali.
14. Paleokhorio (Dagh).
15. Pera Khorio.
16. Ayios Epiphanios
17. Korakou.
18. Aradhiou.
19. Potami.
20. Alona
21. Kalopanayiotis.
22. Ambelikou.
23. Lymbia.
24. Alambra.
25. Kambi.

Famagusta District.

1. Lefkoniko.
2. Paralimni.

Limassol District.

1. Ayios Ioannis.
2. Ayios Mamas.
3. Pelendria.
4. Pissouri.
5. Agros.
6. Kividhes.
7. Phasoula.
8. Mandria
9. Perapedhi.
10. Kapilio.
11. Dhoros.
12. Lania.
13. Limnatis.
14. Apsiou.
15. Ayios Athanasios.
16. Alekhtora.
17. Monagri.
18. Yerasa.
19. Ayios Amvrosios.
20. Ayios Therapon.
21. Kilani.
22. Silikou.
23. Pakhna.
24. Moniatis.
25. Vouni.
26. Phini.
27. Sykopetra.
28. Ayios Theodhoros.
29. Omodhos.
30. Ypsonas.
31. Kyperounda.
32. Agridhia
33. Pentakomo.

Paphos District.

1. Ayios Photios.
2. Letymbou.
3. Galataria.
4. Stroumbi.
5. Kathikas.
6. Pendalia.
7. Statos.
8. Kelokedhara.
9. Pano Panayia.
10. Ayios Ioannis.
11. Polis.
12. Arminou.
13. Ayios Nikolaos.
14. Mesana.
15. Amarketi.
16. Kilinia.
17. Nata.
18. Khoulou.
19. Pretori.
20. Timi.
21. Kallepia.
22. Peristerona.
23. Kedhares.

Larnaca District.

1. Athienou.
2. Aradhippou.
3. Kato Dhrys.
4. Lefkara, Pano.
5. Lefkara, Kato.
6. Kivisil.
7. Mazotos.
8. Odhou.
9. Alethriko.
10. Kalavasos.

Kyrenia District.

1. Kazaphani.
2. Sisklipos.
3. Photta.
4. Asomatos.
5. Kormakiti.

The statements published on pp. 113 and 114 gives the number and kind of trees planted in the various areas of the Island in 1935–36.

It is observed from this statement that the most popular tree in both Tree Planting and non-reserved areas was again this season the almond. 176,790 almond trees have been planted in Tree Planting Areas and 216,425 in non-reserved areas. Forest trees come second in popularity followed by olive, carobs, vines, apricots, etc.

It is gratifying to mention that in some districts, clubs of the "Friends of the Tree" are established. The objects of these clubs are the promotion of tree planting in their districts.

School Gardens also played an important part in the movement for tree planting by providing seedlings and grafted trees to the planters at very low prices.

In a number of villages progress in tree planting is mainly due to the encouraging efforts of the village schoolmasters.

Since the reorganization of the Agricultural Department and stationing of itinerant Agricultural Assistants in 24 different sub-stations throughout the Island it has been possible for the Department of Agriculture to take a more active interest in stimulating tree planting activities.

Publications Reviewed.

PLANT BREEDING ABSTRACTS.—SUPPLEMENT II.

THE Imperial Bureau of Plant Genetics (for crops other than herbage) have published a supplement to Plant Breeding Abstracts. This supplement is a summary of the Annual Reports received at the Bureau from Stations in the British Empire during 1932–35. The supplement summarizes the work on plant breeding and related topics in the British Empire and the publication is a useful form of reference. The chief source of information has been the Annual Reports of the various Colonial Departments of Agriculture and the different Institutions and other bodies concerned with Agricultural Research in the Empire. Every Annual Report of this nature may not be received by the Bureau, therefore, the supplement cannot be considered as complete picture of plant breeding and related work carried out in the British Empire. The publication has, however, involved the scrutiny of over 400 reports and it may, therefore, justly be considered as an invaluable and comprehensive review to practical plant breeders.

The work reported upon includes plant breeding, genetics and cytology. There is also a section on the genetics of plant parasites, and an extensive index.

Advice for Wine Making of the Vintage, 1936.

WITH a defective vintage, as is the case of this year, the various elements of the grape will constitute a favourable medium for the development of bad ferments or microbes, which will influence badly the quality of the wine in general (taste and colour) and more particularly its keeping qualities.

The vintage has been affected seriously by hot winds, heat waves and still more by fungus, such as oidium and peronospora. Under these conditions special care in the making of wine is necessary, otherwise there is serious risk of a great part of the crop becoming unsound or unkeepable wines, good only for distilling.

Prevention is better than cure and in the case of wine nothing or very little can be done when once the wine goes wrong.

The measures to be taken to produce sound wines under conditions such as now prevail are as follows :—

(*a*) As far as possible, make white or rosy wines from red grapes, so as to avoid the fermentation of the juice in the presence of the skins and stocks. If the wine is made in the presence of the skins, any affected grapes must be carefully separated.

(*b*) Reduce the time of fermentation in the presence of the skins and stocks ; that is to say, do not wait for the end of the fermentation to separate the juice from the stocks and skins. A fermentation in their presence, should not last more than 3–4 days more especially if the weather during the wine-making period is very hot.

(*c*) Sulphur dioxide in the form of potassium metabisulphite, should be added to the vintage before the fermentation starts, at the rate of 15 drams per load of wine to be obtained or 5 drams per load of grapes (60 okes) crushed.

(*d*) It is advisable to prepare from healthy and well-ripened grapes a selected yeast, which should be added in the proportion of 2–3 % to the vintage before any fermentation starts.

(*e*) The wine should be racked as soon as it becomes clear and frequent rackings of this wine with addition of 2–3 drams of potassium metabisulphite per load of wine, are necessary, during the year, so as to keep the wine in good condition.

More than the usual care and cleanliness which are always required in a proper wine making is required that is to say:—

(1) Lime washing of the walls and floor of the cellar.

(2) Burning of sulphur in the proportion of 15 drams per cubic metre of capacity, after closing doors, windows and any holes in the cellar, for disinfection.

(3) All the vessels and instruments, which will be used with the grapes or the wine must be thoroughly cleaned and disinfected with a 10 % solution of carbonate of potash and then with abundant clean water.

(4) Wine vessels (jars, vats or casks) should be disinfected with burning sulphur.

Preparation of Selected Yeast.

(*a*) Fill with fresh must a cask or jar to which is added, before any fermentation starts, 20–25 drams of potassium metabisulphite, per load.

(*b*) Heat 6–8 kouzes of fresh must to a temperature of about 70°–75° Celsius ; pour this into a jar and cool it to 30° ; at this moment put into the sterilized must, 2–3 okes of grapes, which have been selected in the vineyard with every care so as to be healthy, clean and ripe and have been transported without having been touched by the fingers.

(*c*) The fermentation will start 8–10 hours ; during this time maintain the temperature of the must at about 30° ; *this is an essential condition.*

(*d*) When the fermentation is proceeding vigorously, add ½ to 1 kouze of the must which was treated with 20–25 drams, of potassium metabisulphite (*a*) and which is not fermenting ; repeat the same after ½ or 1 hour and so on.

(*e*) This prepared yeast is put into the vintage, when it enters the cellar and is placed in the jars or vats sulphured with 15 drams of potassiun metabisulphite per load, a proportion of 2–3 %.

(*f*) The jar with the selected yeast should be fed always with highly sulphured must from (*a*).

TREES PLANTED IN 1935-36 (OTHER THAN TREE PLANTING AREAS).

District or Sub-District	Vines donums	Citrus donums	Almonds No.	Carobs No.	Olives No.	Apples No.	Plums No.	Apricots No.	Peaches No.	Cherries No.	Pears No.	Quinces No.	Walnuts No.	Loquats No.	Forest No.	Figs No.	Other Fruit trees No.
Limassol	369	1,908	21,530	—	480	100	350	600	—	—	300	200	1,000	—	24,180	—	—
Ktima	70	14	1,610	770	55	—	—	—	—	—	—	—	—	—	—	—	—
Nicosia	—	64	27,000	—	3,000	—	—	3,000	—	—	—	—	—	—	7,000	2,000	5,500
Kyrenia	—	80	1,600	—	900	—	—	1,500	—	—	—	—	—	—	—	—	2,100
Larnaca	149	100	5,100	700	1,390	240	40	390	—	—	—	—	—	—	100 (dons.)	170	—
Trikoukkia ..	—	—	—	—	—	2,800	2,200	3,800	—	3,000	1,750	—	—	—	—	—	—
Lefka	503	100	32,675	300	2,954	840	40	2,065	—	40	64	330	100	—	3,722	696	1,375
Polis	216	63	42,600	170	1,190	—	—	—	—	—	—	—	—	—	—	—	370
Stroumbi ..	108	1	6,850	—	550	—	—	—	—	—	—	—	—	—	—	—	80
Yeroskipos ..	219	9	7,500	140	536	—	—	—	—	—	—	—	—	—	—	—	20
Ay. Amvrosios ..	580	1	9,550	—	50	—	—	—	—	—	—	—	—	—	—	—	376
Lefkara	593	100	23,800	370	1,610	190	40	1,850	—	250	220	—	—	—	—	—	—
Agros	347	3	12,590	—	430	1,115	726	921	590	170	650	520	641	—	—	—	—
Nisou	225	40	5,030	—	1,326	—	—	370	—	—	—	—	—	—	—	6,950	—
Famagusta ..	334	850	18,990	4,720	7,650	—	—	—	—	—	—	—	—	—	125,605 & 42 dons.	—	7,210
Total	3,713	3,333	216,425	7,170	22,121	5,285	3,396	14,496	590	3,460	2,984	1,050	1,741	—	160,507 & 142 dons.	9,816	17,031

Total number of trees (other than vines and citrus) planted other than in Tree Planting Areas	466,072
Vines donums	3,713
Citrus donums	3,333
Forest donums	142

TREES PLANTED IN 1935–36 (TREE PLANTING AREAS).

District or Sub-District	Vines donums	Citrus donums	Almonds No.	Carobs No.	Olives No.	Apples No.	Pears No.	Plums No.	Apricots No.	Peaches No.	Cherries No.	Walnuts No.	Loquats No.	Forest No.	Figs No.	Other Fruit trees No.	Quinces No.
Limassol	140	250	29,300	—	—	150	100	—	300	—	—	1,050	—	600	—	—	150
Nicosia	—	86	—	8,000	200	—	—	—	50	—	—	—	—	500	600	200	—
Kazaphani ..	—	—	400	—	100	—	—	—	—	—	—	—	—	—	—	—	—
Sisklipos	10	—	1,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Larnaca	—	—	6,000	1,200	—	—	—	—	—	—	—	—	—	100 (dons.)	—	—	—
Trikoukkia ..	—	—	13,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ambelikou ..	100	—	15,570	—	100	—	—	—	—	—	—	—	—	—	160	55	—
Polis	22	—	10,000	—	300	—	—	—	—	—	—	—	—	—	—	—	—
Stroumbi ..	74	—	—	—	290	—	—	—	—	—	—	—	—	—	—	130	—
Yeroskipos ..	40	532	12,500	—	350	—	—	—	—	—	—	—	—	—	—	—	—
Ay. Amvrosios ..	177	50	24,200	—	—	—	—	—	—	—	—	—	—	—	—	1,317	—
Lefkara	154	240	5,400	—	200	130	200	—	200	—	—	—	—	—	—	—	—
Agros	344	—	28,130	—	100	930	515	593	495	690	230	840	—	—	—	—	340
Nisou	70	—	25,500	800	165	—	—	—	—	—	—	—	—	11,000	—	—	—
Lefkoniko ..	14	—	3,790	—	500	—	—	—	—	—	—	—	—	3,247	—	100	—
Paralimni ..	—	—	—	—	—	—	—	—	—	—	—	—	—	5 (dons.)	—	—	—
Korakou	10	—	2,000	—	—	100	40	—	—	—	—	—	—	—	50	20	15
Total	1,155	1,158	176,790	10,000	2,305	1,310	855	593	1,045	690	230	1,890	—	15,347 & 105 dons.	810	1,822	505

Total number of trees planted in Tree Planting Areas (other than vines and citrus) ..	214,192
Vines donums	1,155
Citrus donums	1,158
Miscellaneous Forest trees donums	105

EDITORIAL AND ADVERTISEMENT NOTICES

All communications for publication should be addressed to the Editor, *Cyprus Agricultural Journal*, Department of Agriculture, Nicosia.

Contributions are invited, written on one side of the paper only. It should be understood that unaccepted manuscripts can not be returned unless postage is prepaid.

Copies of the *Cyprus Agricultural Journal* can be obtained on application to the Department of Agriculture, price 3*cp.* per number, or by post 4*cp.*

Annual subscription payable in advance 16*cp.* post free. Overseas subscription 18*cp.* (2/-).

SCALE OF ADVERTISEMENT CHARGES.

A special reduced rate is charged for all advertisements inserted. As the Journal is circulated throughout the Colony and copies are sent to all Colonies Overseas it may be regarded as a valuable medium for advertising.

The following are the rates in force :—

COVER—Full page, 1 year or 4 insertions ...	£2	0	0
INSIDE PAGES—Full page, 1 year or 4 insertions	1	12	0
„ Half page „	-	16	0
„ Quarter page „	-	8	0

For one insertion only, one-fourth of above charges.

All charges payable in advance.

PRIVATE ADVERTISEMENTS.

For Wants, Articles for Sale or Exchange, Notices of Meetings, Events, etc., for the first 16 words, 2*s.* Exceeding 16 words but not exceeding 32 words, 4*s.* For every additional 8 words 6*cp.*

Advertisements should be written on one side of the paper only, and should reach the Editor, *Cyprus Agricultural Journal*, not later than the 10th of the month of issue.

The "Cyprus Agricultural Journal" is published in March, June, September and December.

The Editor does not necessarily endorse the statements or opinions expressed in contributed articles, the responsibility for which rests with the authors.

The Horse Breeding Law, 1930.

LIST OF STALLIONS LICENSED FOR 1936.

NICOSIA DISTRICT.

Village	*Owner's name*	*Reg. No.*
Akaki ..	Michael Th. Rafti ..	29
do. ..	Elias M. Tsinga ..	203
Argaki ..	Polyvios Theophani ..	153
Astromeritis ..	Christoforos Evangeli ..	26
Elea ..	Rejeb Ahmed ..	254
Kalokhorio ..	Yioryis Papaconstantinou ..	262
Kochati ..	Halil Mehmed ..	264
Lefka ..	Yiangos G. Boyiadji ..	20
Lymbia ..	Andronikos Petri ..	32
do. ..	Kyr. Constantinou ..	33
Mammari ..	Sotiris Ioannou ..	206
Morphou ..	Vasilis T. Spanos ..	18
do. ..	Andreas Ahapittas ..	249
Nicosia ..	Haji Costas Haji Panayi ..	62
Philia ..	Towlis Haralambou ..	255
Xeri ..	Theoris Constanti Menikioti ..	247
Yeri ..	Yeoryos Petri ..	16
Yerolakkos ..	Haralambos Sophokli ..	194
do. ..	Hj. Michael Hj. Loi ..	35

LARNACA DISTRICT.

Alaminos ..	Salih Jumaa ..	64
Aradhippou ..	Costis Kyriakou ..	15
do. ..	Lefteris Towli ..	225
do. ..	Gregoris Sava ..	261
Athienou ..	Yiangos N. Kalapodha ..	22
do. ..	Haris Antoni ..	66
do. ..	Costas N. Haji Vrashimi ..	96
do. ..	Vasilis M. Phiakou ..	159
Kophinou ..	Hussein Handji Ibrahim ..	209
Larnaca ..	Vasilis Demetri ..	43
Voroklini ..	Panayis Theodosi ..	106
do. ..	Haral. A. Chapoulis ..	220

FAMAGUSTA DISTRICT.

Akanthou ..	Yiannis Hambi ..	270
Angastina ..	Gavriel G. Kamenou ..	260
Asha ..	Antonis Michael ..	92
do. ..	Demetris Kounallis ..	208
do. ..	Christos Haji Lavithi ..	234
do. ..	Kyriakos Antoni ..	239

Village	*Owner's name*	*Reg. No.*
Ayios Andronikos ..	Spyros Yeoryi ..	65
do. ..	Christofis Hambi ..	240
Ayios Elias ..	Constantis Stylli ..	246
do. ..	Yeorgios Christodoulou ..	265
Ayios Seryios ..	Antonis S. Gizas ..	68
Ephtakomi ..	Loizos Hambaka ..	219
Famagusta ..	Ibrahim Mehmet Kallika ..	211
Galatia ..	Akil Mustafa Gonie ..	54
Kalopsidha ..	Yeoryios Antoniou ..	267
Komi Kebir ..	Kyriakos Antoniou ..	48
do. ..	Christodoulos K. Sphongos ..	101
Kondea ..	Theocharis Alexandrou ..	193
do. ..	Christos Hanni ..	259
Lefkoniko ..	Mehmed Salih ..	38
do. ..	Christos Haji Symeou ..	41
Leonarisso ..	Chrysanthos Panayi ..	56
Lysi ..	Minas Lysandrou ..	80
do. ..	Artemis Haji Constandoura ..	227
Melanagra ..	Kallis Kyriakou ..	60
Milea ..	Loizos Panayi ..	257
Ovgoros ..	Djafer Emin A. M. Mustafa ..	213
Paralimni ..	Andreas K. Xiouri ..	72
do. ..	Evangelis Haji Vraka ..	172
do. ..	Evangelis Haji Vraka ..	245
do. ..	Nicolas G. Tsiakouras ..	210
do. ..	Demetris A. Maouris ..	244
do. ..	Avraamis Anastasi ..	258
Peristeronopiyi ..	Andreas Louka ..	45
do. ..	Const. K. Haji Yeoryi ..	73
Phrenaros ..	Kyriakos Theori ..	71
do. ..	Adamos Haji Theori ..	226
Rizokarpaso ..	Panayiotis K. Sakka ..	171
do. ..	Christofis N. Koulia ..	241
Sotira ..	Vasilis Demetri ..	252
Styllos ..	Annezou Nikou ..	269
Trikomo ..	Marikou Kyriakou ..	224
do. ..	Demetrios Michael ..	251
do. ..	Kyprianos Stylli Haili ..	266
Vatili ..	Andreas G. Iona ..	86
do. ..	Christina Prokopiou ..	88
do. ..	Vasiliki Haji Christodoulou ..	89
	LIMASSOL DISTRICT.	
Anoyira ..	Thoukis Solomi ..	143
Asgata ..	Demosth. Evangeli ..	119
Ay. Amvrosios ..	Panayis Michael ..	223
Ay. Phyla ..	Costis P. Silikiotis ..	118

Village	*Owner's name*	*Reg. No.*
Episkopi ..	Bairam Mehmed ..	131
Erimi ..	Stephanos Apostoli ..	144
Pakhna ..	Theodoros Evgeniou ..	121
Limassol ..	Mehmed Mustafa ..	40
Mesayitonia ..	Demetris Karkallis ..	117
	PAPHOS DISTRICT.	
Amarketi ..	Mulla A. M. Mustafa ..	125
Dhrousa ..	Yiannis Sava ..	139
Kissonerga ..	Evangelis Haji Nicola ..	126
do. ..	Haji Towlis Haralambou ..	129
Kouklia ..	Mehmed Hassan Kokkinos ..	215
Ktima ..	Veli Tselebis ..	127
Lapithiou ..	Mehmed Mulla Osman ..	263
Lasa ..	Yeoryios Ch. Ellinas ..	130
Pano Arodhes ..	Harilaos Nicolaou ..	136
do. ..	Chrysost. Panayiotou ..	214
Phasli ..	Hassan Tahir ..	228
Phyti ..	Costis Georgiou ..	268
Prodromi ..	Avraamis Sava ..	248
Steni ..	Costis Pelekanides ..	230
Stroumbi ..	Sofoklis Constanti ..	178
Terra ..	Mustafa Yusuf ..	141
	KYRENIA DISTRICT.	
Agridhaki ..	Haralambos Yianni ..	147
Asomatos ..	Christallou Michaeli ..	146
do. ..	Antonis Haji I. Hanni ..	150
Ayios Amvrosios ..	Nicolas Haji Demetri ..	256
Ayios Ermolaos ..	Efstathios Christofi ..	166
Ayios Yeoryios ..	Costis N. Spanou ..	157
Bellapais ..	Savas K. D. Jirkaji ..	161
do. ..	Savas K. Demetriades ..	236
Dhiorios ..	Gregoris Haji Michael ..	148
Kyrenia ..	Shakir Hussein ..	158
Lapithos ..	Polyk. Panayioti ..	99
do. ..	Artemis H. Proestos ..	156
Larnaka tis Lapithou	Ioannis Costi ..	152
Myrtou ..	Cleov. Stylianou ..	149
Sisklipos ..	Lavithis Demetriou ..	232

30th September, 1936.

ROBERT J. ROE,
Chief Veterinary Officer,
Inspector of Horse Breeding.

Meteorological Data, Cyprus.

SUMMARY OF OBSERVATIONS AT REPRESENTATIVE STATIONS.

JUNE, 1936.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall Total inches	Rainfall No. of days rain	Rainfall Greatest fall in one day	Rainfall Average for 10 years inches	Rainfall Dates on which snow fell
Nicosia District:							
Nicosia	89.30	63.14	0.25	1	0.25	0.16	—
Athalassa	—	—	0.57	2	0.53	0.11	—
Morphou	89.15	61.33	—	—	—	0.03	—
Makheras	—	—	—	—	—	0.42	—
Famagusta District:							
Famagusta	89.47	66.07	—	—	—	0.18	—
Akhyritou	87.50	63.20	—	—	—	0.18	—
Rizokarpaso ...	—	—	—	—	—	0.02	—
Lefkoniko	—	—	0.37	2	0.35	0.23	—
Larnaca District:							
Larnaca	89.00	65.00	0.23	2	0.22	0.02	—
Lefkara	—	—	—	—	—	0.13	—
Limassol District:							
Limassol	85.90	62.17	0.08	1	0.08	0.06	—
Saittas	—	—	—	—	—	0.61	—
Trikoukkia	—	—	—	—	—	0.30	—
Alekhtora	—	—	—	—	—	0.006	—
Paphos District:							
Paphos	—	—	—	—	—	0.05	—
Polis...	—	—	—	—	—	0.005	—
Kyrenia District:							
Kyrenia	81.60	66.00	—	—	—	0.04	—

JULY, 1936.

Nicosia District:							
Nicosia	97.23	71.03	—	—	—	0.07	—
Athalassa	—	—	—	—	—	—	—
Morphou	94.77	67.45	—	—	—	—	—
Makheras	—	—	—	—	—	0.08	—
Famagusta District:							
Famagusta	95.32	75.39	—	—	—	—	—
Akhyritou	92.70	69.70	—	—	—	—	—
Rizokarpaso ...	—	—	—	—	—	—	—
Lefkoniko ...	—	—	0.58	1	0.58	0.01	—
Larnaca District:							
Larnaca	97.00	67.00	—	—	—	—	—
Lefkara	—	—	—	—	—	—	—
Limassol District:							
Limassol	90.34	67.35	—	—	—	—	—
Saittas	—	—	—	—	—	0.27	—
Trikoukkia	81.17	60.78	—	—	—	0.11	—
Alekhtora	—	—	—	—	—	0.13	—
Paphos District:							
Paphos	—	—	—	—	—	—	—
Polis...	—	—	—	—	—	—	—
Kyrenia District:							
Kyrenia	88.38	72.16	—	—	—	—	—

Note.—Compiled from returns furnished by Public Works Department

AUGUST, 1936.

District and Station	Shade temperature Mean		Rainfall				
	Maxim.	Minim.	Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District:							
Nicosia	97.00	70.78	—	—	—	0.09	—
Athalassa	—	—	—	—	—	0.04	—
Morphou	97.45	68.61	—	—	—	—	—
Makheras	—	—	—	—	—	—	—
Famagusta District:							
Famagusta	97.35	72.97	—	—	—	—	—
Akhyritou	94.60	71.10	—	—	—	—	—
Rizokarpaso ...	—	—	—	—	—	—	—
Lefkoniko	—	—	0.07	1	0.07	0.09	—
Larnaca District:							
Larnaca	95.00	69.00	—	—	—	—	—
Lefkara	—	—	—	—	—	—	—
Limassol District:							
Limassol	92.32	69.87	—	—	—	—	—
Saittas	—	—	—	—	—	0.07	—
Trikoukkia... ...	—	—	0.80	2	0.50	0.09	—
Alekhtora	—	—	—	—	—	—	—
Paphos District:							
Paphos	—	—	—	—	—	—	—
Polis...	—	—	—	—	—	0.01	—
Kyrenia District:							
Kyrenia	93.12	72.30	—	—	—	—	—

Note.—Compiled from returns furnished by Public Works Department.

Department of Agriculture, Cyprus.

HEADQUARTERS—NICOSIA.

ALL general correspondence should be addressed to the Director of Agriculture.

Correspondence and applications for advice referring to the Veterinary, Entomological, Mycological or Chemical Branches, should be addressed to the Officer in charge of the Branch. When seeking advice in regard to treatment of plant pests or diseases, specimens should, whenever possible, be sent.

GOVERNMENT STOCK FARM, ATHALASSA AND DISTRICT STUD STABLES.

Applications for services of stud animals at Athalassa or the supply of live stock, poultry, eggs, etc., should be addressed to the Manager, Stock Farm, Athalassa. Applications for services of stud animals at District Stud Stables should be made to the Stud Groom in charge. There are Stud Stables at Famagusta, Vatili, Rizokarpaso, Ayios Theodhoros, Lefkoniko, Larnaca, Limassol, Paphos and Polis.

The Cyprus Agricultural Journal

A QUARTERLY REVIEW

OF THE

AGRICULTURE, FORESTRY AND TRADE OF CYPRUS

Vol. XXXI, Part 4 DECEMBER, 1936 Price 3cp.

EDITORIAL NOTES

Agricultural Situation.

The absence of rain until the end of November was giving cause for anxiety among several farmers but all fears of drought are, for the time being, dispelled. During the end of November and early in December most Districts have had excellent rain and the planting of cereals is taking place under satisfactory conditions.

Owing to the exhaustion of natural dry pastures during November, heavy mortality was caused among grazing flocks through under-nourishment.

* * * * * * *

Wheat, Flour and Bread.

In 1933 the price of imported flour was so low that locally-produced millable wheat could not be marketed even at 3*s.* per kilé. In order to protect the local wheat-growing industry, restrictions were placed on imported flour so as to maintain a remunerative price for Cyprus wheat and yet allow the sale of a cheap loaf to the consumer.

Such conditions continued until this year when the situation was completely reversed owing to circumstances entirely beyond local control. The average price of imported flour in October this year rose to £14. 4*s.* 4*p.* per ton as compared with £11. 13*s.* 3*p.* per ton in October last year. The price of local wheat has soared to 7*s.* 4½*p.* per kilé, stocks are scarce and the price of bread has risen. In order to reduce, to some extent, the price of bread a part of the duty on imported flour was removed. Local prices for wheat, flour and bread are governed, to a large extent, by world prices but there has been a tendency to exploit the local market by not releasing stocks while prices were high. The importation of cheap wheat from neighbouring countries and use of substitutes in bread-making have had some effect in controlling the price for local wheat, while the market adjusts itself to the new conditions.

* * * * * * *

Seed Disinfection.

Increasing interest is being shown by farmers in the disinfection of seed corn. Machines for the treatment of seed can be had on loan from the Department and instruction given in their use.

Seed treatment should be carried out as a matter of routine now that the whole process has been much simplified by the introduction of dusts which replace the older wet methods.

The covered smut of barley can be controlled by dusting the grain with ordinary dusting sulphur at the rate of 37½ drams to one kilé of seed. Wheat should be treated with copper carbonate at the rate of 18 drams to the kilé. This chemical controls the covered or stinking smut of wheat and considerably reduces the leaf smut.

* * * * * * *

ORANGE PICKING.

Growers and packers of citrus fruit are reminded that wastage in transit can be very largely prevented. It has already been demonstrated by the Department that wastage is, in the first place, almost entirely due to careless handling of the fruit at picking and during the subsequent operations. Special care should be taken not to bruise the fruit with the clippers and the stalk should always be cut twice to ensure that there is no projecting piece that might injure the fruit in the picking baskets.

Cyprus is one of the few countries where pickers and packers do not wear gloves. If these are not used the finger nails, especially the thumb nails, of all who handle the fruit should be kept short. Little progress can be expected as long as picking is done haphazardly by any casual labour in the grove. Much of the trouble would be eliminated if the crop was bought on the tree and picked by a skilled gang under the constant supervision of a skilled foreman. Such a gang would soon become expert and all fruit exported from one packing house would have received uniform treatment.

The wilting of the fruit should receive more careful an attention. It should be arranged not more than two or three fruits deep on raised platforms with adequate bottom ventilation. In the packing shed care should be taken that all rotten fruit, peel and other debris is cleared away daily and either buried or burnt.

* * * * * * *

CITRUS EXPORTS.

The export of citrus fruits since the commencement of the season to the end of November, 1936, constitute a record over any previous similar period.

The following is a comparative statement of shipments made up to the 30th November for the years 1935 and 1936 :—

Year	QUANTITIES EXPORTED											
	Oranges		Lemons		Bitter Oranges		Sweet Lemons		Grapefruit		Mandarins	
	bxs.	bkts.	bxs.	bkts.	bxs.	bkts.	bxs.	bkts.	bxs.	bkts.	bxs.	bkts.
1935	37,508	810	21,642	411	314	—	—	19	—	—	—	—
1936	127,209	108	31,313	152	437	—	—	—	331	—	187	—

The exports to the United Kingdom for the last two years during the above period were :—

Year	Oranges boxes	Lemons boxes	BitterOranges boxes	Grapefruit boxes	Mandarins Boxes
1935	16,946	20,827	314	—	—
1936	76,505	29,805	437	299	137

Exports to Norway and Sweden were 8,208 boxes and 2,979 boxes respectively in 1935 as compared with 25,370 boxes and 12,490 boxes respectively in 1936.

* * * * * * *

LEMON DAY AT LAPITHOS.

A "Lemon Day" was organized at Lapithos on the afternoon of Wednesday, 11th November, 1936. Mr. A. Panaretos, Agricultural Officer, Famagusta, gave an address about lemon-growing and the Registrar, Co-operative Credit Societies, spoke on the subject of co-operative marketing.

* * * * * * *

AGRICULTURAL SHOWS.

Three Shows were held during the autumn.

A three-day Agricultural and Industrial Exhibition was held at Ktima on the 3rd, 4th and 5th October, for Paphos District. The Exhibition was opened by His Excellency the Governor. This Show received considerable response from the Agricultural communities of Paphos District and was a pronounced success. In connection with this Show, competitions for standing crops were held and it is hoped that this feature may be extended to other Shows in the future.

The second Annual Village Show of Athienou was held on the 15th November for cereal and animals only. There was keen competition in both classes and a large number of exhibitors participated in the classes for animals.

An Agricultural Show organized by the Kyrenia Municipal Corporation was held at Kyrenia on the 21st and 22nd November. The Show was opened by His Excellency the Governor. His Excellency was welcomed by the Mayor of Kyrenia, Mr. Fieros, and the Show was declared open before a large gathering of Kyrenia residents and visitors from other Districts.

* * * * * * *

LIVE-STOCK NOTES.

The live-stock for the Government Stock Farm, purchased with the grant from the Colonial Development Fund arrived early in October.

The Irish draft stallion "Kildare Guard" is 3 years old, grey, and a particularly fine horse. He is now stationed at Athalassa. The Dales pony stallion is 6 years old and is destined for the Paphos District where another Dales pony stallion was kept from 1923 to 1928.

The Kerry bull and dairy Shorthorn cattle have been added to the herd at Athalassa. The four heifers were all in calf, the first one being due to calve in January. They have excellent pedigree records, many of the animals in their pedigrees having won first prizes at important Shows in England. The dairy Shorthorn bull "Chalfield Minstrel 2nd" was third in his class at the Royal Show at Bristol this year.

It has now become possible to place the other Shorthorn bull, "Iford Ambassador 5th" in Nicosia for use among the many dairy cows kept in the town.

An auction sale was held at Athalassa on the 27th November when surplus stock was sold, realizing the following prices :—

Stock Sold	*Average Price* £ *s.* *p.*
9 bullocks and one bull	3 12 2
2 barren Shorthorn cows	8 5 4½
1 jack donkey	2 18 0
6 cross-bred sheep, 4 lambs and 1 native ram ..	– 13 8
3 cross-bred lambs	– 9 8
3 goats	– 14 7
2 kids	– 5 0
3 sows	2 5 0
31 young pigs	– 5 7
29 head of poultry	– 2 4
4 turkeys	– 7 8

Total realized : £85. 8*s.* 6*p.*

The Thoroughbred stallion " Moleskin " has been issued on loan at Nisou to travel in that district. Two other stallions are to be issued on loan at Limassol and Evdhimou as this secures a wider distribution than is otherwise possible, since there are now 11 Government-owned stallions in the Island. One stallion " Mazarin " has had to be destroyed after 13 years' service in the Island.

* * * * * * *

CYPRUS SHIPPERS' ASSOCIATION.

A Meeting of the Council of the Cyprus Shippers' Association was held at Famagusta on the 16th November, 1936, when the position of the formation of the proposed Cyprus Citrus Exporters Association as a sub-section of the Cyprus Shippers' Association was discussed.

As no satisfactory decision could be arrived at in regard to organizing the Citrus Shippers the following resolution was passed :—

" That no further meetings of the Council should be held until the next General Meeting of the members of the Association and that the Chairman and Secretary thereof be authorized to carry out the ordinary work of the Association."

The General Meeting will be held early next year when the future of the Association will be considered.

* * * * * * *

AGRICULTURAL ADVISORY COMMITTEE.

A meeting of the Agricultural Committee was held on Saturday, 5th December, 1936, in the Office of the Director of Agriculture at 10 a.m. and the following agenda discussed :—

(*a*) Seed Corn Loans.
(*b*) Price of Bread.
(*c*) Import Duties on Flour.
(*d*) Valuation of Immovable Properties.
(*e*) Postponement of Foreclosures.
(*f*) Rate of Interest.
(*g*) Borings for underground water.
(*h*) Improvement of Cotton Growing.
(*i*) Compulsory Tree Planting.
(*j*) Provision of Work for Poor People.

Injurious Insects of Cyprus.

BY H. M. MORRIS, M.Sc., F.R.E.S., *Government Entomologist, Cyprus.*

[*Continued from September issue.*]

DIPTERA :

CECIDOMYIDÆ :

Asphondylia gennadii, March. (Carob Midge), causes very considerable damage to carob pods (" Brachycarpia " disease). Eggs are laid in the flowers or young pods in the autumn and the larvæ feed inside the pods in the winter. In the early spring the attacked pods remain small and become misshapen while healthy pods are growing rapidly. The pupal stage occurs inside the pod and the pupæ subsequently project from the pods and the adults then emerge from about the end of April into June. There are at least two further generations in the young carob pods during the summer and autumn.

Asphondylia capsici, Barnes.—This species attacks the fruit of *Capsicum annuum* which the larvæ cause to be misshapen and stunted.

Asynapta fucifer, Barnes.—The larvæ of this species occur fairly commonly in olive fruit. Olives damaged by *Dacus oleæ* or other causes are probably preferred but sound olives may also be attacked.

Dasyneura oleæ, F. Lw., causes galls on the leaves of olives.

Mayetiola destructor, Say. (Hessian Fly).—This insect appears to be generally distributed in the Island and sometimes causes very considerable damage to wheat and barley in the spring. It appears on the whole that earlier sown crops are most liable to attack, but owing to the irregular occurrence of the first rain in the autumn it is not possible to indicate safe sowing dates as can be done elsewhere.

PSYCHODIDÆ :

Phlebotomus minutus, Rond.

Phlebotomus papatasii, Scop.—" Sandflies " are very troublesome throughout all except the higher parts of the Island during the summer, and these two species have so far been identified.

CULICIDÆ :

A full account of the anopheline mosquitoes of Cyprus has been published(1) and lists are also given in that publication of the Culicines.

Culex pipiens, L., occurs very commonly.

Aëdes argentatus, Poir., is also a common species.

Theobaldia longiareolata, Meq., is also a common species.

Anopheles superpictus, Grassi, appears to be the commonest anopheline. (*Pyretophorus palestinensis* recorded by Williamson(2)=*A. superpictus*).

Other species of Culicines and Anophelines are known to occur, including *A. bifurcatus*, L., *A. hyrcanus*, Pall., *A. sacharovi*, Favr., (*elutus*, Edw.), and *A. algeriensis*, Theo.

SIMULIDÆ :

Simulium equinum, L. and *S. aureum*, Fries., have been taken.

Flies belonging to this family are sometimes troublesome in the spring.

(1) Aziz, M. *The Anopheline Mosquitoes of Cyprus*, Health Department Papers No. IV, Cyprus, 1934.

(2) Williamson, G. A., *Biting Flies* " Addendum to the Report of the Commission appointed to enquire into the working of irrigation reservoirs in the Mesaoria," Cyprus, 1909, pp. 11–12.

CHIRONOMIDÆ :

" Midges " belonging to this family are very troublesome in the spring in some areas.

TABANIDÆ :

Chrysops (*Heterochrysops*) *italica*, Meig., is stated to occur.

Chrysops perspicillaris, Lw.—Recorded by Williamson (1).

Chrysops punctifera, Lw. and *Tabanus autumnalis*, L., are fairly common in some places.

Other species belonging to this family have also been obtained but are not yet identified.

TRYPETIDÆ :

Acidia heraclei, L. (Celery Fly), has been bred from larvæ mining in celery leaves.

Ceratitis capitata, Wied. (Mediterranean Fruit Fly).—This insect is very destructive to many kinds of fruit throughout all the lower parts of the Island. Its attacks are most troublesome on citrus fruit, mandarins and thin-skinned oranges being particularly attacked. In the winter the development of the insect is much delayed by the cold weather but citrus fruit remaining on the trees in the spring is severely attacked. Black mulberry, pear and peach appear to be preferred fruits during the summer, but this insect is unable to survive the severe winter in the mountains where most pear, apple and peach growing occurs and therefore it is not a serious pest of these fruits except in the lower areas.

The common practice of growing one or two apricot, fig or other fruit trees in citrus plantations creates conditions very favourable to the multiplication of *Ceratitis*, as does also the neglect of fallen and over-ripe fruit, in which it is often allowed to breed freely in neglected plantations.

Dacus oleæ, Mg. (Olive Fly).—This destructive pest of the olive fruit occurs throughout the Island wherever olives are grown, and also attacks the fruit of the wild olive trees growing on the mountains. The adult female punctures the skin and lays her eggs in the flesh of the fruit, where the larvæ feed and tunnel. The pupa appears usually to be formed in the fruit, the larva first making its way outwards until only enclosed by the skin of the fruit and the adult on emerging from the pupa breaks through the skin at this point. There are several generations during the year and the attack on olives collected from the trees late in the season, in November and December, is usually very severe, while in most years there is a considerable attack by September.

Myiopardalis pardalina, Big.—An occasional pest of melons, in the fruit of which the larvæ tunnel.

LONCHÆIDÆ :

Lonchœa aurea, Macq. (*splendida*, Lœw), bred from cotton bolls from which *Platyedra* and *Earias* were also bred. Also bred from melons.

Lonchœa chorea, F. (*vaginalis*, Fall.), has been bred from larvæ in figs.

DROSOPHILIDÆ :

Drosophila melanogaster, Mg. (*ampelophila*, Lw.), bred from figs, mandarins, pears, pomegranates, tomatoes and berries of *Cratægus azarolus*. Probably only over-ripe or damaged fruit is attacked.

Gitona beckeri, Duda. (*distans*, Bezzi), bred from cotton bolls and from figs.

(1) Williamson, G. A., *Biting Flies* "Addendum to the Report of the Commission appointed to enquire into the working of irrigation reservoirs in the Mesaoria," Cyprus, 1909, pp. 11–12.

EPHYDRIDÆ :

Hydrellia griseola, Hn., bred from larvæ mining in the leaves of barley, occurring abundantly on one occasion in a small area.

SEPSIDÆ :

Piophila casei, Fln., has been bred from locally cured ham.

GEOMYZIDÆ :

Balioptera tripunctuta, Hn., whose larvæ attack the shoots of graminaceous plants, has been taken but no damage due to its attacks has been recorded.

ANTHOMYIDÆ :

Chortophila (*Delia*) sp., bred from larvæ causing destruction of melon seeds in the ground after sowing.

MUSCIDÆ :

Musca domestica, L. (House Fly).—Very abundant everywhere.

Stomoxys calcitrans, Geoff. (Biting House Fly, Stable Fly).—Abundant everywhere.

Muscina stabulans, Hn., bred from melons, and also from tomatoes attacked by *Heliothis obsoleta*, F.

CALLIPHORIDÆ :

Calliphora erythrocephala, Mg. (Blue Bottle Fly).—Rather common. Bred from larvæ in locally cured ham.

Chrysomyia albiceps, Wied., also occurs.

SARCOPHAGIDÆ :

Sarcophaga hæmorrhoidalis, Schim., bred from tomatoes from which *Heliothis obsoleta*, F., was also bred.

Sarcophaga destructor, Mall., bred from fallen apricots, potatoes and tomatoes with the previous species.

OESTRIDÆ :

A species of *Oestrus* believed to be new, has been taken and is believed to occur commonly.

Gastrophilus intestinalis, DeG. (Horse Bot Fly), has been taken and is believed to occur commonly.

Hypoderma ceratum, Austin. (Goat Warble Fly).—The larvæ of this species are found very commonly on goats, often in large numbers, and occasionally on sheep. The adults appear particularly to choose kids for oviposition and larvæ are found much more abundantly in animals not yet a year old than in older animals.

HIPPOBOSCIDÆ :

Hippobosca equina, L., occurs commonly.

Hippobosca capensis, v. Olf.—Taken on dog.

HYMENOPTERA :

TENTHREDINIDÆ :

Two or three species have been taken in small numbers but no damage due to them has been recorded.

SIRICIDÆ :

Sirex noctilio, F.—A number of specimens were bred from larvæ in pine logs on one occasion. They were parasitized by the Cynipid, *Ibalia leucospoides*, Hoch.

FORMICIDÆ (Ants) :

One species, not yet identified, occasionally causes damage to orange trees by eating the leaves.

[illegible] (Almond Wasp), is a very common pest of almonds. The eggs are laid in or on the young soft almonds, which the larvae enter on hatching, feeding inside the kernel during the summer and autumn, and they remain full grown inside the shrivelled kernel during the winter to pupate there in the spring. The adults leave the almonds in the spring by cutting a hole through the shell. Attacked almonds frequently turn black and remain firmly attached to the twigs throughout the winter.

This insect also attacks apricots and caishas in a similar manner, when the attacked fruit becomes dry and black but does not as frequently remain firmly attached to the twigs in the winter as in the case of almonds.

MUTILLIDÆ :

Several species belonging to this family occur and the apterous females are frequently seen. Species recorded are *Tropidotilla syriaca*, André, *Myrmilla erythrocephala*, Latr., *Dasylabris maura*, L., and *Pycnotylla barbara*, var. *calva*, L. The females are known locally as "sphalangi" and are greatly feared owing to their being believed to transmit Anthrax by their bite.

VESPIDÆ :

Vespa germanica, Ltr. (Wasp), occurs commonly and is said to have been introduced into the Island some years ago in hopes of reducing the numbers of flies.

Vespa orientalis, F. (Hornet), occurs commonly and is a considerable pest of various kinds of fruit, especially grapes, and also of bee-hives. It nests usually in holes in walls or amongst loose stones, but also nests in the ground.

MEGACHILIDÆ :

Several species of leaf-cutting bees occur and cause a certain amount of damage at times by cutting pieces out of the leaves of almonds, roses, etc., for the construction of their cells.

ACARINA :

ERIOPHYIDÆ :

Eriophyes cladophthirus, Nalepa.—Recorded once causing damage to potato leaves.

Eriophyes granati, Can. and Massal.—A pest of pomegranate trees, sometimes very abundant and causing a considerable amount of defoliation.

Eriophyes pyri, Pagst.—Taken damaging the buds of apple trees.

Eriophyes sp.—Attacking walnut leaves, causing numerous patches of matted hairs on the leaves similar to those on the vine known as "Erinose," and due to the next species.

Phyllocoptes vitis, Nalepa.—Occurs frequently on vine leaves causing the development of patches of matted hairs on the under side of the leaves and corresponding raised areas on the upper side and known as "Erinose." The hairs are at first whitish but later in the season become brown, and in cases of severe attack an appreciable proportion of the leaf surface may be affected, but ordinarily the attack is probably unimportant.

INJURIOUS INSECTS CLASSIFIED BY HOST PLANTS.

ALMOND :
Jassid.
Lachnus persicæ, Burn.
Hyalopterus arundinis, F.
Myelois ceratoniæ, Zell.
Epicrocis anthracanthes, Meyrick.
Clytra atraphaxides, Pall.
Gynandrophthalma limbata, Stev.
Anthonomus cyprius, Marshall.
Lixus algirus, L.
Scolytus amygdali, Guer.
Epicometis hirta, Poda.
Oxythyrea abigail, Rche.
Adoretus pullus, Baudi.
Eurytoma amygdali, End.
Megachilidæ.

"AMERICAN BLACKBERRY" :
Haltica ciliciensis, Weise.

APPLE :
Stephanitis pyri, F.
Jassid.
Doralis pomi, Deg.
Dentatus roseus, Baker.
Parlatoria oleæ, Colv.
Parlatoria pergandii, Comst.
Zeuzera pyrina, L.
Hyponomeuta padellus, L.
Cydia pomonella, L.
Olethreuthes (*Argyroploce*) *pruniana*, Hb.
Schistocerus bimaculatus, Ol.
Anthonomus pomorum, L.
Scolytus amygdali, Guer.
Eriophyes pyri, Pagst.

APRICOT AND CAISHA :
Anarsia lineatella, Zell.
Recurvaria nanella, Hb.
Olethreuthes (*Argyroploce*) *pruniana*, Hb.
Ptosima undecimmaculata, Hbst.
Scolytus amygdali, Guer.
Ceratitis capitata, Wied.
Eurytoma amygdali, End.

ARTICHOKE :
Pyrameis cardui, L.
Sphæroderma testaceum, F.
Podagrica malvæ, Ill.
Cassida ?palestina, Rch.
Lixus lutescens, Cap.

ASPARAGUS :
Crioceris bicruciata, Sahlb.

BARLEY (see also "Cereals") :
Mayetiola destructor, Say
Hydrellia griseola, Hn.

BEANS :
Dolycoris baccarum, L.
Aphis rumicis, L.
Phytometra gamma, L.
Ocnogyna lœwi, Zell.
Lixus sp.
Sitona lineata, L.
Sitona limosa, Rossi.

CABBAGE :
Brevicoryne brassicæ, L.
Plutella maculipennis, Curt.
Hellula undalis, F.
Pieris brassicæ, L.
Pieris rapæ, L.

CAROB :
Chrysomphalus aurantii, Mask.
Aspidiotus hederæ, Vallot.
Aspidiotus britannicus, Newst.
Lecanium elongatum, Sign.
Lepidosaphes ulmi, L.
Myelois ceratoniæ, Zell.
Cerambyx heros, Scop.
Asphondylia gennadii, March.

CARROT :
Papilio machaon, L.

CAULIFLOWER :
Brevicoryne brassicæ, L.
Plutella maculipennis, Curt.
Hellula undalis, F.
Pieris brassicæ, L.
Pieris rapæ, L.
Phyllotreta cruciferæ, Goze.

CELERY :
Acidia heraclei, L.

CEREALS (see also "Wheat and Barley") :
Dociostaurus maroccanus, Thnb.
Dolycoris baccarum, L.
Syringopais (*Scythris*) *temperatella*, Led.
Lema melanopa, L.

CHERRY :
Dolycoris baccarum, L.
Anarsia lineatella, Zell.
Eugonia polychloros, L.
Scolytus rugulosus, Ratz.

CITRUS (see also separate varieties) :
Stenozygum coloratum, Kl.
Toxoptera aurantiæ, B.d.F.
Chrysomphalus aurantii, Mask.
Aspidiotus lataniæ, Sign.
Lecanium hesperidum, L.
Pseudococcus citri, Risso.
Lepidosaphes beckii, Newm.
Ceroplastes floridensis, Comst.
Icerya purchasi, Mask.
Charaxes jasius, L.
Chiloneus brevithorax, Desbr.
Ceratitis capitata, Wied.

COTTON :
Calliptamus italicus, L.
Tettigonia viridissima, L.
Decticus albifrons, Serv.
Aphis gossypii, Glov.
Platyedra gossypiella, Saund.
Earias insulana, Bois.
Sibinia planiuscula, Desbr.
Gitona beckeri, Duda.

CRATAGUS AZAROLUS :
Ceroplastes rusci, L.
Drosophila melanogaster, Mg.

CYPRESS :
Chionaspis striata, Newst.
Phlœosinus armatus, Reitt.

DATE :
Coccotrypes dactyliperda, F.

FIG :
Ceroplastes rusci, L.
Lepidosaphes ficus, var. *nicosiæ*, Green.
Ceratitis capitata, Wied.
Lonchæa chorea, F. (*vaginalis*, Fall.).
Drosophila melanogaster, Mg.
Gitona beckeri, Duda.

FLAX :
Aphthona euphorbiæ, Schrank.
Longitarsus parvulus, Payk.

FRUIT (see also separate varieties):
Dolycoris baccarum, L.
Cicada orni, L.
Parlatoria oleæ, Colv.
Parlatoria zizyphi, Lucas.
Zeuzera pyrina, L.
Cerambyx velutinus, Brull.
Chlorophorus varius, Mull.
Scolytus rugulosus, Ratz.
Scolytus amygdali, Guer.
Ceratitis capitata, Wied.
Vespa orientalis, F.

LEMON (see also " Citrus ") :
Chrysomphalus aurantii, Mask.
Parlatoria zizyphi, Lucas.

LOQUAT :
Parlatoria oleæ, Colv.
Scolytus rugulosus, Ratz.

MAIZE :
Heliothis (*Chloridea*) *obsoleta*, F.
Cirphis ?loreyi, Dup.

MANDARIN (see also " Citrus "):
Ceratitis capitata, Wied.
Drosophila melanogaster, Mg.

MELON :
Thrips tobaci, Lind.
Aphis gossypii, Glov.
Epilachna chrysomelina, F.
Tenebrionid larvæ.
Rhaphidopalpa foveicollis, Küst.
Temnorhynchus baal, Reiche.
Myiopardalis pardalina, Big.
Lonchæa aurea, Macq. (*splendida*, Lœw.)
Chortophila (*Delia*) sp.

MPAMIA (Hibiscus esculentus) :
Earias insulana, Bois.
Podagrica malvæ, Ill.

MULBERRY :
Chrysomphalus aurantii, Mask.
Lecanium persicæ, Geoff.
Ceratitis capitata, Wied. (on black mulberry).

OLIVE :
Schistocerca gregaria, Forsk.
Euphyllura olivina, Costa.
Aleurolobus olivinus, Silvestri.
Lecanium (*Saissetia*) *oleæ*, Bern.
Leucodiaspis riccæ, T.T.
Pollinia pollini, Costa.
Prays oleella, Fabr.
Zeuzera pyrina, L.
Margaronia (*Glyphodes*) *unionalis*, Hb.
Omophlus propagatus, Kirsch.
Rhynchitis ruber, Fairm.
Phlœotribus oleæ, F.
Phlœotribus caucasicus, Reitt.
Asynapta fucifer, Barnes.
Dasyneura oleæ, F. Lw.
Ducus oleæ, Mg.

ORANGE (see also "Citrus"):
Ceroplastes rusci, L.
Lepidosaphes beckii, Newm.
Papilio machaon, L.
Podagrica malvæ, Ill.
Lixus algirus, L.
Epicometis hirta, Poda.
Ceratitis capitata, Wied.

ORNAMENTAL PLANTS:
Chionaspis striata, Newst. (on *Thuya*).
Galeatus scrophicus, Saund. (on chrysanthemum).
Acherontia atropos, L. (on *Datura*).
Deilephila livornica, Esp. (on *Linaria*).
Chærocampa alecto, L. (on virginia creeper).
Clytra nigrocincta, Lac. var. (on turpentine tree, *Pistachia* sp.)
Phyllotreta corrugata, Rche. (on stocks and wallflowers).
Baris timida, Rossi. (on hollyhock).
Epicometis hirta, Poda. (on flowers and tree seedlings).
Oxythyrea abigail, Rche. (on flowers).

PEA:
Dolycoris baccarum, L.

PEACH:
Lachnus persicæ, Burn.
Hyalopterus arundinis, F.
Parlatoria oleæ, Colv.
Anarsia lineatella, Zell.
Recurvaria nanella, Hb.
Cydia pomonella, L.
Anthonomus cyprius, Marshall.
Lixus algirus, L.
Ceratitis capitata, Wied.

PEAR:
Stephanitis pyri, F.
Cydia pomonella, L.
Eugonia polychloros, L.
Anthonomus pomorum, L.
Protætia cuprea, F.
Adoretus pullus, Baudi.
Ceratitis capitata, Wied.
Drosophila melanogaster, Mg.

PEPPER (Capsicum annuum):
Asphondylia capsici, Barnes.

PINE:
Leucaspis knemion, Hoke.
Leucaspis pusilla, Lœw.
Thaumetopœa wilkinsoni, Tams.
Hypophlœus fraxini, Kugel.
Pogonochærus perroudi, Muls.
Ips erosus, Wol.
Ips (*Pityogenes*) *porifrons*, Eggers.
Myelophilus piniperda, L.
Sirex noctilio, F.

PLANE:
Rhesus serricollis, Mots.

PLUM:
Lachnus persicæ, Burn.
Hyponomeuta padellus, L.
Cydia pomonella, L.
Olethreutes (*Argyroploce*) *pruniana*, Hb.
Scolytus amygdali, Guer.

POMEGRANATE:
Aleurotrachelus cyprusi, Dozier.
Doralis punicæ, Pass.
Lepidosaphes conchiformis, Gmel.
Zeuzera pyrina, L.
Niphona picticornis, Muls.
Drosophila melanogaster, Mg.
Eriophyes granati, Can. & Massal.

POTATO:
Dolycoris baccarum, L.
Eurydema festiva, L.
Phthorimœa operculella, Zell.
Phlyctænia fulvalis, Hb.
Laphygma exigua, Hb.
Prodenia litura, F.
Acherontia atropos, L.
Tenebrionid larvæ.
Eriophyes cladophthirus, Nalepa.

QUINCE:
Lecanium (*Saissetia*) *oleæ*, Bern.
Cydia pomonella, L.

ROSE:
Chrysomphalus aurantii, Mask.
Adoretus pullus, Baudi.
Megachilidæ.

SORGHUM:
Cirphis ?loreyi, Dup.

SPINACH-BEET:
Sitona oculata, Küst.

TORED PRODUCTS :
Sitotroga cerealella, Ol.
Ephestia elutella, Hb.
Ephestia kühniella, Zell.
Ephestia afflatella, Mn.
Ephestia cautella, Wlk.
Myelois ceratoniæ, Zell.
Pyralis farinalis, L.
Sterrha herburiata, F. var.
Galleria mellonella, L.
Tenebroides maurilanicus, L.
Carpophilus hemipterus, L.
Carpophilus dimidiatus, F.
Silvanus surinamensis, L.
Anthrenus verbasci, L.
Attagenus bifasciatus, Ol.
Trogoderma versicolor, Creutz.
Lasioderma serricorne, F.
Ptinus fur, L.
Rhizopertha dominica, F.
Triboleum castaneum, Hbst.
Triboleum confusum, Duv.
Bruchus dentipes, Bdi.
Bruchus lentis, Fröb.
Bruchus chinensis, L.
Bruchus rufimanus, Ksh.
Bruchus analis, F.
Calandra granaria, L.
Calandra oryzæ, Hn.
Piophila casei, Hn.

TOBACCO :
Tettigonia viridissima, L.
Decticus albifrons, Serv.
Opatroides punctulatus, Brull.
Zophosis punctata, Brull.

TOMATO :
Laphygma exigua, Hb.
Heliothis (*Chloridea*) *obsoleta*, F.
Phytometra chalcytes, Esp.
Drosophila melanogaster, Mg. (*ampelophila*, Lw.).

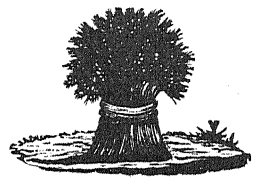
VEGETABLES, General :
Schistocerca gregaria, Forsk.
Tridactylus variegatus, Latr.
Liogryllus bimaculatus, Deg.
Nezara viridula, L.

VINE :
Schistocerca gregaria, Forsk.
Termites.
Cryptothrips brevicollis, Bagnall.
Dolycoris baccarum, L.
Targionia vitis, Sign.
Polychrosis botrana, Schiff.
Zygæna (*Theresia*) *ampelophaga*, Bayle.
Deilephila livornica, Esp.
Chœrocampa alecto, L.
Omophlus propagatus, Kirsch.
Psalidium aurigerum, Desbr.
Epicometis hirta, Poda.
Vespa orientalis, F.
Phyllocoptes vitis, Nalepa.

WALNUT :
Chromaphis juglandis, Gœtze.
Cydia pomonella, L.
Cerambyx heros, Scop.
Eriophyes, sp.

WATTLE (*Acacia* sp.) :
Aspidiotus hederæ, Vallot.

WHEAT (see also " Cereals ") :
Dolycoris baccarum, L.
Epicometes hirta, Poda.
Oxythyrea abigail, Reiche.
Mayetiola destructor, Say.



Diseases of Sheep and Goats.

With Special Reference to Cyprus.

BY R. MOYLAN GAMBLES, *Veterinary Officer.*

INTRODUCTORY.

THE raising of sheep and goats is an important industry in Cyprus, and large numbers of villagers rely entirely on them for their livelihood. There are about three quarters of a million sheep and goats in the Island, seven times as many as all the other domesticated animals put together. The health of the flocks is, therefore, a matter of the greatest importance. There are three extremely serious diseases affecting these animals in Cyprus, viz.: Anthrax, Variola, and Parasitic Gastroenteritis. The first two of these are now more or less under control, and great progress is being made in controlling the third. There are also numbers of other diseases of lesser importance, and others which do not occur here, but would become serious scourges if they were accidentally introduced.

This article attempts to give a brief account of the various diseases affecting sheep and goats, calling special attention to those which occur in Cyprus, or would cause serious harm if they were to be introduced. It is divided into three parts. The first, and most important, deals with the Contagious Diseases caused by Bacteria (or germs) and Viruses (living agents which are too small even to be seen with the microscope). The second deals with diseases caused by animal parasites, protozoa (or microscopic single-celled animals), worms of various kinds, and insects and ticks, etc. The third deals with various accidental, sporadic, and non-specific affections.

PART I.—DISEASES CAUSED BY BACTERIA AND VIRUSES.

ANTHRAX, (*Phlangara*).—The most important disease of sheep and goats in Cyprus is undoubtedly Anthrax, a disease which is also dangerous to most other animals, including man. Fifteen years ago about 10% of the flocks used to die annually from this disease, and in heavily affected areas, such as parts of the Paphos District, the Kyrenia Hills, and the Karpas, the mortality was often as high as 25–30%, and in some villages even up to 40%. Now, thanks to the Government's policy of compulsory vaccination, the disease is practically unknown among sheep, and only a few hundred goats are lost each year.

The disease is caused by a germ which is swallowed while the animal is grazing or drinking (and occasionally by other means), and then invades the blood. The course of the disease is normally very rapid, and death usually takes place ten minutes to two hours after the onset of visible symptoms, although the animal has been incubating the disease for some days, and has probably had a high temperature during part of that time. Sometimes the animal is found dead without its having been noticed to be ill at all. Occasionally the animal is ill for several days before it dies, but this is rare.

The animal stops following the flock, stands still, and trembles. It frequently walks round in circles. It soon falls down, and after a short struggle dies. There is frequently a discharge of bloodstained mucus from the nostrils (and sometimes from the anus) at the time of death,

If the animals live long enough, there may be a bloodstained Diarrhœa, or even bloodstained Urine. The carcase becomes blown up after death much more rapidly than after most other diseases.

If the carcase is opened, the spleen will usually be seen to be swollen up and dark in colour, although it is sometimes normal in appearance. The intestines are usually deeply congested and reddened. The blood is usually dark in colour, and does not clot as readily as in the normal animal. But it is extremely dangerous to open any carcase where there is any possibility of Anthrax, and this should never be done in the case of any animal that dies suddenly. The disease can be diagnosed with certainty by microscopic examination of a drop of blood. Where the disease is suspected, an ear from a freshly dead animal should be forwarded to the Veterinary Laboratory. If the ear is tied tightly with string in two places close together, and cut off between them, little or no virulent blood will be spilled.

The disease is spread by spilling the blood of an infected animal. As long as the carcase is left whole, the germ is in the "vegetative" form, and if the carcase is buried, the germs soon die during the course of putrifaction. But if the infected blood is exposed to the air, the germs turn into another form, the "spore," which is extremely hard to kill, and remains a source of danger for many years. Spores are spilled over the pasture in millions every time an Anthrax carcase is skinned, or opened to see the cause of death. Sometimes shepherds slaughter sick animals, and the blood is spilled on the pastures, or even into a stream. By this means, spores are spread widely, and may cause the death of large numbers of animals drinking from it. It is equally dangerous to leave carcases unburied, or buried not sufficiently deep to prevent dogs from digging them up. Dogs, vultures, and various insects which come to feed on the carcase spread the disease to a great extent. Flies may become contaminated and spread the disease by settling on wounds, and other insects may play a part in its transmission. The dog itself is not readily infected with Anthrax, but contaminates its mouth, chest, and paws with blood, and so infects the pastures over which it walks, and streams and fountains where it drinks. Vultures do not live in such close contact with the flocks as do dogs, but they probably play a still more important part in the spread of the disease. It is possible that the spores they swallow while feeding may pass through the bowel unchanged, making their droppings infective. This would account for the high incidence of the disease in the Kyrenia Hills, where most of the vultures nest. They feed on carcases both nearby and in the plains, and then return to their nests in the crags dropping virulent spores to be washed down by the rain to the areas used as pastures by the hill villages.

Enormous progress in the control of Anthrax has been made during the last fifteen years, but its complete eradication from the Island will still take many years, and can only be achieved through close co-operation between the Veterinary Service and the flock-owners. Losses among sheep can be entirely prevented by vaccination, but the immunization of goats is more difficult, and if a very heavy dose of Anthrax spores is picked up while grazing, even vaccinated goats may occasionally become infected, although never in the great numbers that were lost in the days before vaccination was introduced. Owners can help by

abstaining from slaughtering ill animals, and by properly disposing of all carcases, burying them deep, beyond the reach of dogs, and leaving the skin intact. Thus fresh infection of pastures will be prevented, and in time, the spores already present will die out.

SHEEP-POX AND GOAT-POX, (*Variola, Evloyia*).—These two diseases are distinct in that Sheep-Pox does not affect goats, nor Goat-Pox sheep. But the two diseases are identical in appearance, pass through the same stages, and the measures to be taken for the control of the disease are the same in either case, so they will be dealt with together.

The disease is caused by a virus, and infection is brought about by inhalation of dust contaminated by fallen scabs. The disease passes through five distinct stages. In the first (or preliminary) stage, there is a general febrile reaction, as the virus is absorbed through the lungs and bronchi, and circulates in the blood. The animal shows a high temperature, is dull, does not feed, and may have a cough. This stage lasts four or five days. In the second (or roseolar) stage, the virus settles down in the skin and produces red spots, mostly on the inside of the thighs, along the belly, on the udder, under the tail, and on the face, although any part of the body may be affected. It is at the end of this stage, or the beginning of the next, that most deaths occur from the disease. In the third (or vesicular) stage, vesicles appear in the red patches, filled with a clear and slightly yellowish fluid. In a very severe case of the disease, these vesicles may be so many, and so close to each other, that many of them will become joined together. The second and third stages together last about five or six days. In the fourth (or pustular) stage, the clear fluid in the vesicles becomes white and pus-like. This lasts four or five days. In the last (or scab) stage, the pustules have become dry scabs, and these fall off in about ten days, leaving a smooth round white scar underneath. If they are pulled off before they are ready to fall, they leave a moist dirty area, covered with dry pus. When all the scabs have fallen, the animals recover in a few days. In winter, many animals die during the scab stage, but in the summer, if the flocks are in good condition, animals that reach the scab stage usually survive. The total mortality, if the condition of the flocks is good, as in summer (except in drought years), does not usually exceed 5% of the total flock; but in winter, 15–20% or even more may die. Mortality is higher in neglected flocks than when they are cared for.

There is no actual treatment for the disease. Control measures consist of putting affected areas into quarantine. The disease is very contagious, and all the flocks in the quarantine area are likely to become infected before the area is free from the disease. Therefore, all non-affected animals in the area are vaccinated. There are two methods possible. The "ovination" method consists in carefully drawing off a little of the clear fluid from the vesicles of an animal in the third stage of the disease, and placing some of this greatly diluted with water on a patch of lightly scarified skin. This usually forms a localized infection, and the result is purely a skin disease, without the first stage, in which the virus circulates in the body. Thus the violent general reaction is avoided, and the animal is unlikely to suffer at all severely from the disease. There is always, however, a danger of a general infection being set up by ovination,

It is, therefore, safer to use the other method, and apply a Laboratory-prepared Vaccine, in which the virus is weakened with boric acid, and is unable to cause a general reaction. The vaccinated animal is then certain of a very mild local attack of the disease, after which it will be immune, and saved from a much more severe natural attack.

CONTAGIOUS PUSTULAR DERMATITIS (*Infectious Labial Dermatitis, Scabby-Mouth, Anemevloyia*).—This is a very contagious disease affecting sheep and goats, and is very common in Cyprus. It is usually a mild disease, but if flocks are neglected it can cause considerable losses. Its chief importance lies in the possibility of confusion with a mild case of Pox. It is possible that the recent outbreaks of Sheep and Goat-Pox, after their supposed absence for many years, were not due to a fresh infection introduced from abroad, but that a few cases had been carrying on in a mild form, and were mistaken for Contagious Pustular Dermatitis. Then, during the drought, when all the animals were in very poor condition, the pox asserted itself, and assumed a highly virulent form, which swept over almost the whole Island.

Contagious Pustular Dermatitis is caused by a virus, and is purely a disease of the skin. There is no general reaction, as in Pox, and the temperature shows little or no rise above the normal. The lesions usually commence on the lips, as infection is taken up while grazing on contaminated pastures. Occasionally they commence on the feet, where they may cause lameness for one or two days. The disease can also be spread to the feet from the mouth, by the animals scratching at the lips with the feet. Lesions can also occur on the udder, usually from being sucked by infected kids. They are rare on other parts of the body.

The lesion commences as a small hard nodule in the skin, which passes rapidly into a crusty scab, which dies and falls off, from 5–20 days after its appearance. If lesions are actually inside the mouth, they may pass through a vesiculo-pustular stage. They often cause inconvenience while feeding, so that the animal appears to lose its appetite for a few days. But more often the animals are able to continue to feed normally. When the affected animals are unable to graze, they must be hand-fed. If this precaution is neglected, the animals will become weak, and so suffer much more severely from the disease. The chief danger with the disease is that the scabs may get torn off before they are ready to fall, either while the animal is feeding, or by scratching. A raw surface is left, and this may become infected with other organisms, or may be attacked by flies, and become filled with maggots. This can be prevented by dressing the lips, especially in animals where there is a raw surface, or any bleeding round the base of the scabs, with oil containing a small amount of carbolic and eucalyptus.

HÆMORRHAGIC SEPTICÆMIA.—On two occasions in Cyprus there have been outbreaks of disease which is suspected to have been Hæmorrhagic Septicæmia, although this was never confirmed by the Laboratory. Only sheep were affected.

The symptoms of the disease are a rise in temperature, Diarrhœa, which is sometimes bloodstained, and Pneumonia, which is shown by laboured and painful breathing. Sometimes a soft watery swelling is

noticed under the jaws. When the disease is present in a very acute form, death may take place before Pneumonia has had time to develop.

If the carcase is opened, numerous hæmorrhages will be noticed in the internal organs, spots of blood under the covering membranes. These are especially noticeable in the heart (both inside and out), the omentum, and the mesentery, with its associated lymph-glands. The lungs will usually be greatly inflamed, with hæmorrhages, and often a marked thickening of the septa between the lobes. The intestines frequently show patches of inflammation. The spleen is not enlarged as it frequently is in Anthrax. In its acutest form, when death is rapid, the disease may sometimes be confused with Anthrax, but the latter can always be distinguished by microscopic examination of the blood, if an ear from a freshly dead animal is submitted to the Laboratory.

The severity of the disease varies in different outbreaks, and is much more serious when the sheep are in poor condition, or suffering from other diseases (such as parasites) at the same time.

CONTAGIOUS ABORTION.—Large numbers of sheep and goats abort every year in Cyprus. This often due to the poor condition of the flocks, the result of insufficient food, or food of bad quality, or due to parasites, internal and external. It is sometimes, however, due to contagious disease. There is one very serious form of Contagious Abortion affecting goats (and sometimes sheep) called Malta Fever. It is caused by a germ which is very closely related to that which causes Contagious Abortion in cattle. Malta Fever is particularly dangerous, as it can be transmitted to man, often with fatal results. Man acquires the disease through drinking milk of an affected sheep or goat, and it takes the form which is called Undulant Fever. It is no longer known to exist in Cyprus. It was once introduced with some Maltese goats, but appears to have been successfully stamped out. There are two other kinds of Contagious Abortion affecting sheep, Vibrionic Abortion, which is not known to occur in Cyprus, and Salmonellar Abortion, which has been found here on several occasions. It is not possible to say how common this disease is, because although fœtuses have frequently been sent to the Veterinary Laboratory, they have usually arrived in too putrified a condition for the cause of the abortion to be discovered.

The disease is spread by infected fœtal membranes, and by the discharges of the mother after abortion. It is, therefore, wise to isolate any animal that aborts, until all discharges have ceased, and the fœtus and all its membranes should be burnt immediately.

TETANUS (" *Lockjaw* ").—This is mainly a disease of horses, but may affect almost any animal, and is quite common in sheep, and may also occur in goats. It is caused by a germ which lives in the soil and enters the body through wounds, *e.g.* through the navel of newborn lambs, or through the wounds caused by castration, or made while shearing. All such wounds should always be carefully disinfected. Iodine is the most potent disinfectant against this particular germ.

The germ multiplies in the wound, and forms a powerful poison which is absorbed and affects the nervous system. The first symptoms usually noticed are a difficulty in swallowing, and a protrusion of the third eyelid, which may almost cover the eye. There may be stiffness of the

neck, and also of the legs. Gradually whole groups of muscles become thrown into spasms. The jaw muscles are usually the first to become affected, and the jaws become firmly locked together. Soon the whole body is affected. In the commonest form of the disease, the head is thrown back, the back hollowed, and the limbs extended. Sometimes the head is thrown downwards and the back arched. Sometimes the body is curved sideways, but this is not common. Eventually, after much suffering, the animal dies of exhaustion. No lesions are seen at postmortem, other than the original wound where the germ entered the body.

Treatment is not advisable, as affected sheep scarcely ever recover. As soon as the spasms commence, and the animal becomes stiff, it suffers very great pain, and should be slaughtered at once, to end its misery.

BLACKQUARTER.—This is mainly a disease of cattle, but it can also affect sheep and goats, like Anthrax, it is caused by a germ which lives in the soil, and infection is spread by failure to dispose of carcases. In this disease, however, the germs are mainly confined to the local lesions, instead of being widespread through the body. Infection is usually through a wound, but this is not always visible, as it may have healed up before symptoms of the disease appear.

The first symptom of the disease is a high temperature, and if (as is often the case) the lesion is on one of the limbs, lameness is also an early symptom. Then a swelling appears, usually either near the shoulder or at the quarter. This turns dark red or black, and if touched, is found to crepitate, owing to the presence of much gas under the skin and in the muscle. Very similar types of swellings are caused by closely related germs, and are called by other names, such as "Malignant Oedema" and "Gas Gangrene."

Treatment is not advisable, for, affected animals seldom recover, and any incision into the wound will spread the infection. Carcases should be buried deep without skinning. On pastures where Blackquarter is common, animals can be protected by a special vaccine prepared against the disease.

ENTEROTOXÆMIA, ETC.—There is a group of diseases caused by germs closely related to those of Blackquarter and Malignant Oedema, which are usually referred to as the Enterotoxæmia group and cause heavy losses in some parts of the world. In these diseases (Braxy, Lamb-Dysentery, Strike, Black Disease, Pulpy Kidney, etc.), the germs do not infect a wound, or cause gas-containing swellings, but live in the intestines, and produce poisons which are absorbed, and set up the symptoms of the various diseases (frequently sudden death). It is possible that some of these diseases may occur in Cyprus, although none of them have been definitely recognized, if so, they are not common enough to do any serious harm.

TUBERCULOSIS.—Sheep are not often affected with this disease, and no case have ever been found in Cyprus. When sheep are affected, the lesions are usually in the lungs or neighbouring lymp-glands. Enlarged glands may press on the œsophagus, and interfere with the return of gases from the stomach, causing the animal to become blown,

JOHNE'S DISEASE.—This is mainly a disease of cattle, but sheep can also be affected. It does not, however, occur in Cyprus. The Intestines become thick and wrinkled, so that very little food can be absorbed. There is constant diarrhœa, which becomes steadily worse, and the animal becomes extremely thin and emaciated, and eventually dies.

CASEOUS LYMPHADENITIS.—This is a chronic disease of sheep, which causes serious losses in some parts of the world, and is caused by a germ which enters the body through wounds, and sets up cheesy abscesses in the lymph-glands in various parts of the body.

Affected animals do not thrive, and gradually grow more emaciated. The enlarged glands can be felt, and are often visible as large swellings, which are painless and hard. At post-mortem when the affected glands are cut open, they are found to contain large spherical masses of cheesy matter, which is often arranged in concentric layers, and in old lesions is often calcified.

The germ causing this disease, or a very similar one, was once found in a cheesy abscess in a sheep slaughtered in Famagusta, but no other cases are known to have occurred in Cyprus, and the disease is of no importance here.

ACTINOMYCOSIS AND ACTINOBACILLOSIS ("*Lumpy-jaw*" and "*Wooden-tongue*").—These are two diseases very similar to each other, caused by two closely related germs, and mainly affect cattle, although they are sometimes found in sheep. No case in sheep has been found in Cyprus, but as it occurs in cattle here, it is always possible for a sheep to become infected.

The germs enter through wounds in the alimentary canal, through the empty sockets when the teeth are changing, or carried into the tissues by grass-awns, or other pieces of sharp prickly plants. When no wounds are caused, they do not enter the tissues, and they are frequently present in the alimentary canal in large numbers, without doing any harm. But when they penetrate, they set up hard fibrous swellings containing small pockets of pus, in which are numerous small hard granules. As the pus is not all in one place, these cannot be opened up and drained like acute abscesses.

Various parts of the body are affected, but most commonly in or near the head. Actinomycosis usually affects the bones of the head which become spongy and swollen, and sometimes forms lesions in the liver. Actinobacillosis affects the tongue and the lymph-glands of the head and neck. When the tongue is affected, feeding becomes painful, and the animal stands with its mouth open, salivating freely. In the glands, the disease is just indicated by swellings.

Actinobacillosis can be cured, if taken early enough, by treating with small doses of potassium iodide or biniodide of Mercury. In Actinomycosis, the bony tissues of the jaw are altered in structure by the disease, so no drug can cure the condition, although treatment might prevent the condition becoming worse.

FOOT AND MOUTH DISEASE.—Cyprus has fortunately been free of the scourge for a great many years, and it is to be hoped that it never visits us again. Its chief danger lies in the fact that it is extremely contagious,

and accordingly spread exceedingly rapidly. Last time it occurred here (in 1917) it spread over the whole Island and probably nearly every animal was affected. The mortality from the disease is not high, but the animals lose condition greatly, and nearly all the females abort the following year. It, therefore, causes much more severe lose than diseases which are more fatal, but affect fewer animals.

The disease is caused by a virus, and affects mainly cattle, sheep, goats and pigs, although other animals and man can sometimes be affected. It is characterized by a sudden rise in temperature (more severe in sheep than in cattle), followed by the formation of vesicles full of clear watery fluid, in the mouth, and on the feet, occasionally on other parts of the body. In sheep, the feet are more severely affected than is usual in cattle, and the lesions in the mouth are fewer and smaller. In cattle the irritation in the mouth leads to profuse salivation, but this is frequently not noticed in sheep. Instead, they snap the jaws and grind the teeth. The animals also become lame, sheep more severely so than cattle.

The disease is very easily spread by contaminated foodstuffs and straw packing, etc., imported from abroad, so the danger of its suddenly appearing in Cyprus must always be borne in mind. Whenever the disease is suspected, it must be notified at once to the nearest Government Veterinary Officer, who will advise what measures are to be taken. No time must be wasted by an owner trying to treat the disease himself.

RINDERPEST (*Cattle-plague*).—This disease is caused by a virus, and mainly affects cattle, but may also affect sheep and goats. It occurs mainly in Africa and the Far East. It does not exist in Cyprus. It spreads very rapidly. Affected animals show a violent diarrhœa, with inflammation and ulceration of the whole alimentary tract, and often of the respiratory system as well. In a short time the animal becomes completely emaciated and is a mere bag of skin and bones. In sheep, the mortality is about 50%.

RABIES (*Hydrophobia*).—This is another virus disease that fortunately does not occur in Cyprus. It is mainly a disease of dogs, driving them mad, and killing them in a very short time. The disease is spread by the bite of the mad animal. Sheep, like every other animal, can be infected if bitten by a mad dog. An affected sheep becomes excited, stamps its feet, and attacks others in the flock. It soon becomes paralyzed, and dies in 3–5 days.

LOUPING ILL (*Trembling, Dizzy Shivers*).—This is another virus disease affecting the brain, and is spread by the bite of ticks. It has never been found in Cyprus. The affected animal falls down, struggles violently, and dies in a very short time. There are no lesions to be seen at post-mortem.

[*To be continued.*]

Broom Rape.

(*Orobanche* spp.)

BY R. M. NATTRASS, *Plant Pathologist.*

CULTIVATED plants are not only subject to diseases caused by fungi and bacteria but are also attacked by parasitic flowering plants. Of these, various species of Dodder (*Cuscuta*) are well known and obvious parasites and their habit of twining themselves round their victims and extracting nourishment from them can be easily seen. An account of the Flax Dodder which is typical of this family appeared in this *Journal*, Vol. XXIX, June, 1934.

In contrast to the Dodders which only attach themselves to the above ground parts of the attacked plants, are the various species of broom rape (*Orobanche* spp.) which attach themselves to the roots.

FIG. 1.—Crop of Broad Beans severely attacked by Orobanche resulting in total loss of the crop.

The broom rapes are annuals and, in common with other parasitic plants, are leafless containing no chlorophyll or green colouring matter. There are several species in Cyprus and they attack a number of crop plants. The crop which suffers most severely is the broad bean which is attacked by one of the largest species, *Orobanche Crenata* Forsk., the large flowering spikes of which can easily be seen among the bean plants (Fig. 1). So severely is this crop sometimes attacked that the number of spikes occasionally outnumbers the bean plants and the crop is almost a complete loss.

The plant of *Orobanche* consists almost entirely of a thick flowering stem the base of which is scaly and becomes slightly tuberous. The flowers are numerous and may extend for 12 inches or more from the apex of the stem downwards. They are more or less bell shaped, whitish or flesh coloured and frequently striped with light purple. On approaching maturity the whole spike turns brown and the flowers become dry and papery.

The seeds, which are produced in many seeded capsules, are extremely small, being almost dust like, and measuring about $\frac{1}{2}$ a millimetre or $\frac{1}{50}$ of an inch in length and rather less in breadth (Fig. 3). Many thousands of such seeds are produced from each flowering spike. So minute and light are these seeds that they are easily carried by the wind. The diagram shows the seeds of *Orobanche* compared with those of flax, tomato and cuscuta.

FIG. 3.—Seeds of Orobanche (*top centre*) compared with Tomato (*left*), Flax (*right*) and Dodder, all magnified×10 approx.

The seeds of the broom rape only germinate on coming into contact with the roots of the plant on which they are parasitic. On germination the seedlings are at first thread-like resembling those of *Cuscuta*. The seedling then becomes attached to the roots of the bean by means of a sucker or haustorium and afterwards develops into a thick brownish shoot bearing the spike of flowers at the apex. These may attain a length of two feet or more. During the whole of its life it obtains nourishment at the expense of the bean plant—as can be seen in the illustration no leaves are produced (Fig. 2).

Control.—The broom rapes are annuals and can, therefore, only be reproduced by means of the seeds. As the seeds are so minute there is no danger of them being introduced with the seeds of any crop even if only moderately well screened. The seeds may, however, remain dormant in the soil for a considerable period and attack the same crop later in the rotation.

The flowers of the bean broom rape ripen their seeds earlier than the bean so that when the crop is harvested, the seeds are already scattered in the soil or disseminated by the wind. It can best be dealt with by extracting the plants before the flowers have set the seed. With the bean crop this can be done by hand and is well worth the labour spent. When the attack is particularly severe or occurs in small patches, the parasite should be dug up and burnt. It is, however, a waste of time

dealing with the pest if the flowers have once reached maturity. The common practice in Cyprus of harvesting the crop and leaving the broom rape standing is the surest way of propagating the parasite and rendering the land useless for a susceptible crop. To be of any value at all the spikes must be extracted as soon as they appear.

FIG. 2.—Orobanche attached to the roots of a Broad Bean plant; the Orobanche possesses neither leaves nor roots.

If a crop of beans has been badly attacked they should not be grown on the same land again for as long an interval as possible. Only systematic hand pulling as often as the broom rape appears will rid the land of this parasite.

Sericultural Notes.

DEMONSTRATIONAL SILKWORM REARING IN GIRLS' SCHOOLS, 1936.

DEMONSTRATIONAL silkworm rearings have been carried out during 1936 in 127 Orthodox-Christian and 15 Moslem schools where approximately 1,850 girls attended the rearing and acquired a useful knowledge of sericulture. Twelve of these rearings failed wholly or partially owing to lack of care by the mistresses, or to accident.

The maximum production of cocoons was at the rate of 76 okes of cocoons per ounce of silkworm eggs and the average for the 130 successful rearings was at the rate of 46 okes per ounce of silkworm eggs; the average production for the Island is 24 okes 132 drams (1936).

The Agricultural College Old Students' Club Cup for the year 1936 has been awarded to the Girls' School of Mazotos (Schoolmistress Miss Phroso Nikolaou) which obtained the highest production of cocoons (76 okes of cocoons per ounce of silkworm eggs).

Prizes for 1936 were given by the Agricultural Department in co-operation with the Education Department to the following schoolmistresses :—

PRIZES OF £1 IN EACH DISTRICT.

Nicosia District.

Pera Khorio : Christina Michael.

Larnaca District.

Mazotos : Phroso Nikolaou.

Limassol District.

Episkopi (Orthodox-Christian) } 15*s.* each { Ioulia Voreadhou.
do. (Moslem) } { Zekhra Kiouzite.

Famagusta District.

Varosha : Anastasia Michaelidou, Irini Dhrymiotou, Ioanna Kolokasidou, Theano Andronikou, Niovi Griva, Elli Euthyvoulou.

Kyrenia District.

Kyrenia (Moslem) : Zehra Ali Riza.

Paphos District.

Ktima (Moslem) : Katriá Houloussi.

PRIZES OF 10*s.* EACH.

Nicosia District : 27 Schools.	*Famagusta District :* 21 Schools.
Larnaca District : 9 Schools.	*Paphos District :* 13 Schools.
Limassol District : 12 Schools.	*Kyrenia District :* 14 Schools.

TRIALS OF SILKWORM EGGS, 1936.

The trials of silkworm eggs carried out in 1936 at the Agricultural Department's Sericultural Station at Kalopanayiotis were arranged on similar lines to those of 1935, which were described on page 96 of this "Journal" for December, 1935 (*Cyprus Agricultural Journal*, Vol. XXX, Part 4).

The eggs used in these trials in 1936 were as follows :—

(A) Eggs produced in the Sericultural Station the previous year and the result of three years selection in the Station.

(B) Eggs produced by crossing the races "Jean Blanc" and "Barret" (No. 0).

(C) Ditto, (No. 00).

(D) Eggs imported commercially.

The eggs (B) and (C) above were supplied by the *Société Française de Sériciculture*, Marseilles.

Five separate rearings were made from each of these four lots of eggs, each rearing consisting of ½ dram of eggs, so that there were 20 rearings altogether. The rearings were all treated similarly and reared in the same rooms so that any difference in yield of cocoons obtained should be due to differences in the eggs and not to any other cause.

All the eggs were put in the incubator at the same time. The (D) eggs commenced to hatch 2 to 3 days earlier than the others and completed hatching about a day earlier, but all the varieties commenced spinning at about the same time.

Four of the five lots of (D) eggs gave smaller yields than any of those given by the other eggs, the highest yields obtained being at the rate of 56 okes per ounce of eggs given by one of the lots of (B) eggs.

The average yields given by the five lots of each variety were as follows, calculated as the yield per ounce (8 drams) of eggs :—

(A) 51 okes 96 drams. (C) 51 okes 48 drams.
(B) 54 okes 144 drams. (D) 44 okes 26 drams.

The differences between (A), (B) and (C) are relatively small but may indicate that the (B) eggs may be expected to give a slightly better yield than (A) or (C), but the difference is not great enough to make this quite certain. There is no real difference between (A) and (C). The yield given by the (D) eggs is distinctly less than those given by (A), (B) and (C).

It must be pointed out that these experiments were carried out at Kalopanayiotis, at an altitude of about 2,350 feet, and, therefore, the results may not be the same as those which might be obtained under different climatic conditions in other parts of the Island.

The average production obtained in 130 Girls' Schools in the 1936 season was 46 okes per ounce of eggs, using the same eggs as those in (A) above, and the average yield for the Island was 24 okes 132 drams. The average yield obtained from the (D) eggs (44 okes 26 drams) was rather less than the average yield (44 okes 256 drams) obtained from eggs from the same source in 1935, but the eggs produced in the Sericultural Station gave a yield of 51 okes 96 drams in 1936, compared with 48 okes 288 drams in 1935.

HIBERNATION OF SILKWORM EGGS.

The same house at Pedhoulas which was used for this purpose last year has been rented by the Agricultural Department for the natural hibernation of all locally produced and imported silkworm eggs, where they will be under the supervision of the Agricultural Assistant stationed at Kalopanayiotis. All silkworm eggs are required to remain in hibernation from 5th January to 20th February.

ISSUE OF MULBERRY PLANTS FREE OF CHARGE.

The Agricultural Department has again arranged for the issue of mulberry plants this season from the nursery and school gardens free of charge to farmers interested.

Farmers desirous of taking advantage of this offer should apply to the nearest Agricultural Station.

A total of 17,000 young mulberry plants were issued free of charge last season to farmers from nursery gardens and school gardens.

COMPARATIVE STATEMENT SHOWING THE QUANTITY OF SILKWORM EGGS HATCHED OUT AND REARED DURING THE YEARS 1934, 1935 AND 1936.

District	1934	1935	1936
—	ozs.	ozs.	ozs.
Nicosia	710	858	820
Larnaca	271	249	230
Limassol	179	138	170
Famagusta	1,130	985	1,023
Paphos	1,269	800	750
Kyrenia	1,026	940	1,098
Total	4,585	3,970	4,091

THE FOLLOWING TABLE SHOWS THE QUANTITY OF SILK COCOONS AND SILK PRODUCED IN 1936, AS SHOWN IN AGRICULTURAL OFFICERS' REPORTS.

District	Cocoons purchased by merchants okes	Cocoons used for egg production okes	Cocoons spun into thread okes	Cocoons reeled okes	Silk produced okes	Total production of cocoons in okes
Nicosia.. ..	1,000	722	848	16,800	2,026	19,370
Larnaca ..	250	—	1,200	5,450	659	6,900
Limassol ..	371	6	40	3,953	504	4,370
Famagusta ..	800	130	1,800	17,870	2,100	20,600
Paphos.. ..	7,000	156	3,800	8,144	1,019	19,100
Kyrenia ..	2,889	—	986	25,315	3,082	29,190
Total ..	12,310	1,014	8,674	77,532	9,390*	99,530

* All silk was reeled by local reeling apparatus.

Banana Growing in Cyprus.

BANANA growing is carried on on a small scale in certain areas in Paphos District, where small plantations provide profitable sidelines to a few enterprising farmers. There are two varieties of banana grown : the "Paphitiko," a large plant bearing bananas of the "fig" type and the "Zanzibari," a dwarf variety similar to the Cavendish. Both varieties produce fruit of good flavour at prices ranging from 5*s*. to 7*s*. per bunch, which leaves a substantial margin for profit. There is no reason why the area under the crop should not be increased, but improved methods should be adopted by growers. The two drawbacks to banana growing in Cyprus are wind and the possibility of frost and the crop can only be grown with success in well sheltered areas in those parts of the Island where the winter is mild.

Cultivation.—The true stem of the banana plant is an underground rhizome with very short internodes which gives rise to the trunk or "pseudostem" composed of sheathing leaf bases, as well as a large number of suckers. Propagation can be done by planting pieces of the

parent rhizome (" bits "), or the suckers. There are two types of sucker, the sword sucker which is recognized by its long pointed leaves and arises at the base of the rhizome and the broad leaf type which resembles a banana plant in miniature and arises near the surface. The former is preferred for planting, and should be removed from the parent plant when 3–4 feet in height.

Preparation of the land before planting is important and deep cultivation coupled with heavy dressings of organic manure are essential if good yields are to be obtained. Holes 2′ square should be dug to receive the suckers and half filled with organic matter. The root system of bananas is poor and every encouragement must be given to produce adequate reserves of plant food in the soil. The best spacing for the plants is 10′ by 10′ for the *Paphitiko* variety and 7′ by 7′ for the *Zanzibari*, with one sucker per hole.

The first bunch will be ready for harvest in about a year's time and subsequent bunches will depend on the method of pruning adopted. Suckers are produced throughout the growing season and much of the art of growing bananas depends on which are removed and which are allowed to remain. There are several systems of pruning in vogue, but the general principle is to produce a succession of bunches as close together as possible without having more than one bunch in the course of production at any given time. Leaving too many suckers to develop will result in loss of vigour and production of small bunches. It is suggested that not more than four suckers should be developing at once, for example one would be bearing a bunch ready for harvest, the second would be about half mature and the others in early stages of growth.

A bunch should be harvested when still green, when the hard ridges on the bananas have become rounded off, and allowed to ripen off the tree. All leaves and trash should be returned to the soil and mulched round the base of the stool. As a general estimate the banana yields one bunch the first year, and two in the second, third and possibly fourth years, after which it is advisable to replant. Manurial dressings are important and a suggested dressing is 5 okes organic manure plus $\frac{1}{5}$ oke of sulphate of potash per tree per bunch, the crop removing a disproportionately large amount of potash from the soil, a fair amount of nitrogen and a little phosphate. Manure has no effect on a bunch after the inflorescence has appeared, so application of manures should be made early. The plants require a large amount of water and frequent irrigations should be given in the dry months.

After bunches have been harvested, it is essential that the ripening process is carried out at a comparatively high temperature. Fifty-four degrees Fahrenheit may be regarded as the absolute minimum that a bunch will stand without " chill " effects resulting in failure to ripen. The poor flavour of some of the late bunches from Paphos is undoubtedly due to chilling after harvest.

SUMMARY.

1. Bananas are cultivated profitably, but haphazardly, in Paphos District and it may be possible to extend cultivation in the sheltered parts of the Island.

2. Suggestions are made concerning the improvement of the cultivation of the crop.

3. A note on the danger of " chilling " is given.

EDITORIAL AND ADVERTISEMENT NOTICES

All communications for publication should be addressed to the Editor, *Cyprus Agricultural Journal*, Department of Agriculture, Nicosia.

Contributions are invited, written on one side of the paper only. It should be understood that unaccepted manuscripts can not be returned unless postage is prepaid.

Copies of the *Cyprus Agricultural Journal* can be obtained on application to the Department of Agriculture, price 3*cp.* per number, or by post 4*cp.*

Annual subscription payable in advance 16*cp.* post free. Overseas subscription 18*cp.* (2/-).

SCALE OF ADVERTISEMENT CHARGES.

A special reduced rate is charged for all advertisements inserted. As the Journal is circulated throughout the Colony and copies are sent to all Colonies Overseas it may be regarded as a valuable medium for advertising.

The following are the rates in force :—

COVER—Full page, 1 year or 4 insertions ...	£2	0	0
INSIDE PAGES—Full page, 1 year or 4 insertions	1	12	0
„ Half page „	–	16	0
„ Quarter page „	–	8	0

For one insertion only, one-fourth of above charges.

All charges payable in advance.

PRIVATE ADVERTISEMENTS.

For Wants, Articles for Sale or Exchange, Notices of Meetings, Events, etc., for the first 16 words, 2*s.* Exceeding 16 words but not exceeding 32 words, 4*s.* For every additional 8 words 6*cp.*

Advertisements should be written on one side of the paper only, and should reach the Editor, *Cyprus Agricultural Journal*, not later than the 10th of the month of issue.

The "Cyprus Agricultural Journal" is published in March, June, September and December.

The Editor does not necessarily endorse the statements or opinions expressed in contributed articles, the responsibility for which rests with the authors.

The Horse Breeding Law, 1930.

LIST OF STALLIONS LICENSED FOR 1936.

NICOSIA DISTRICT.

Village	*Owner's name*	*Reg. No.*
Akaki	Michael Th. Rafti	29
do.	Elias M. Tsinga	203
Argaki	Polyvios Theophani	153
Astromeritis	Christoforos Evangeli	26
Elea	Rejeb Ahmed	254
Kalokhorio	Yioryis Papaconstantinou	262
Kato Kopia	Yeoryios Haji Haralambou	27
Kochati	Halil Mehmed	264
Lefka	Yiangos G. Boyiadji	20
Lymbia	Andronikos Petri	32
do.	Kyr. Constantinou	33
Mammari	Nicolas Haji Haralambou	206
Meniko	Michaelis Haji Gibri	26
Morphou	Vasilis T. Spanos	18
do.	Andreas Ahapittas	249
Nicosia	Haji Costas Haji Panayi	62
Philia	Towlis Haralambou	255
Xeri	Theoris Constanti Menikioti	247
Yeri	Yeoryos Petri	16
Yerolakkos	Haralambos Sophokli	194
do.	Hj. Michael Hj. Loi	35

LARNACA DISTRICT.

Alaminos	Salih Jumaa	64
Aradhippou	Costis Kyriakou	15
do.	Lefteris Towli	225
Athienou	Yiangos N. Kalapodha	22
do.	Haris Antoni	66
do.	Costas N. Haji Vrashimi	96
do.	Vasilis M. Phiakou	159
Kophinou	Hussein Handji Ibrahim	209
Larnaca	Vasilis Demetri	43
Voroklini	Panayis Theodosi	106
do.	Haral. A. Chapoulis	220

FAMAGUSTA DISTRICT.

Akanthou	Yiannis Hambi	270
Angastina	Gavriel G. Kamenou	260
Asha	Antonis Michael	92
do.	Demetris Kounallis	208
do.	Christos Haji Lavithi	234
do.	Kyriakos Antoni	239

Village	*Owner's name*	*Reg. No.*
Ayios Andronikos ..	Spyros Yeoryi ..	65
do. ..	Christofis Hambi ..	240
Ayios Elias ..	Constantis Stylli ..	246
do. ..	Yeorgios Christodoulou ..	265
Ayios Seryios ..	Antonis S. Gizas ..	68
Ephtakomi ..	Loizos Hambaka ..	219
Famagusta ..	Ibrahim Mehmet Kallika ..	211
Galatia ..	Akil Mustafa Gonie ..	54
Kalopsidha ..	Yeoryios Antoniou ..	267
Komi Kebir ..	Kyriakos Antoniou ..	48
do. ..	Christodoulos K. Sphongos ..	101
Kondea ..	Christos Hanni ..	259
Lefkoniko ..	Mehmed Salih ..	38
do. ..	Christos Haji Symeou ..	41
Leonarisso ..	Chrysanthos Panayi ..	56
Lysi ..	Minas Lysandrou ..	80
do. ..	Artemis Haji Constandoura ..	227
Melanagra ..	Kallis Kyriakou ..	60
Milea ..	Loizos Panayi ..	257
Do. ..	Sotira Panayi ..	193
Ovgoros ..	Djafer Emin A. M. Mustafa ..	213
Paralimni ..	Andreas K. Xiouri ..	72
do. ..	Evangelis Haji Vraka ..	172
do. ..	Evangelis Haji Vraka ..	245
do. ..	Nicolas G. Tsiakouras ..	210
do. ..	Demetris A. Maouris ..	244
do. ..	Avraamis Anastasi ..	258
Peristeronopiyi ..	Andreas Louka ..	45
do. ..	Const. K. Haji Yeoryi ..	73
Phrenaros ..	Kyriakos Theori ..	71
do. ..	Adamos Haji Theori ..	226
Rizokarpaso ..	Panayiotis K. Sakka ..	171
do. ..	Christofis N. Koulia ..	241
Sotira ..	Vasilis Demetri ..	252
Styllos ..	Annezou Nikou ..	269
Trikomo ..	Marikou Kyriakou ..	224
do. ..	Demetrios Michael ..	251
do. ..	Kyprianos Stylli Haili ..	266
Vatili ..	Andreas G. Iona ..	86
do. ..	Christina Prokopiou ..	88
do. ..	Vasiliki Haji Christodoulou ..	89
	LIMASSOL DISTRICT.	
Anoyira ..	Thoukis Solomi ..	143
Asgata ..	Demosth. Evangeli ..	119
Ay. Phyla ..	Costis P. Silikiotis ..	118

Village	*Owner's name*	*Reg. No.*
Episkopi ..	Bairam Mehmed ..	131
Limassol ..	Mehmed Mustafa ..	40
Mesayitonia ..	Demetris Karkallis ..	117
Pakhna ..	Theodoros Evgeniou ..	121
	PAPHOS DISTRICT.	
Amarketi ..	Mulla A. M. Mustafa ..	125
Dhrousa ..	Yiannis Sava ..	139
Kissonerga ..	Evangelis Haji Nicola ..	126
do. ..	Haji Towlis Haralambou ..	129
Kouklia ..	Mehmed Hassan Kokkinos ..	215
Ktima ..	Veli Tselebis ..	127
Lapithiou ..	Mehmed Mulla Osman ..	263
Lasa ..	Yeoryios Ch. Ellinas ..	130
Pano Arodhes ..	Harilaos Nicolaou ..	136
do. ..	Chrysost. Panayiotou ..	214
Phasli ..	Hassan Tahir ..	228
Phyti ..	Costis Georgiou ..	268
Prodromi ..	Avraamis Sava ..	248
Steni ..	Costis Pelekanides ..	230
Stroumbi ..	Sofoklis Constanti ..	178
Terra ..	Mustafa Yusuf ..	141
	KYRENIA DISTRICT.	
Agridhaki ..	Haralambos Yianni ..	147
Asomatos ..	Christallou Michaeli ..	146
do. ..	Antonis Haji I. Hanni ..	150
Ayios Amvrosios ..	Nicolas Haji Demetri ..	256
Ayios Ermolaos ..	Efstathios Christofi ..	166
Ayios Yeoryios ..	Costis N. Spanou ..	157
Bellapais ..	Savas K. D. Jirkaji ..	161
do. ..	Savas K. Demetriades ..	236
Dhiorios ..	Gregoris Haji Michael ..	148
Kyrenia ..	Shakir Hussein ..	158
Lapithos ..	Polyk. Panayioti ..	99
do. ..	Artemis H. Proestos ..	156
Larnaka tis Lapithou	Ioannis Costi ..	152
Myrtou ..	Cleov. Stylianou ..	149
Sisklipos ..	Lavithis Demetriou ..	232

ROBERT J. ROE,
Chief Veterinary Officer,
Inspector of Horse Breeding.

31*st December*, 1936.

Meteorological Data, Cyprus.

SUMMARY OF OBSERVATIONS AT REPRESENTATIVE STATIONS.

SEPTEMBER, 1936.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall Total inches	Rainfall No. of days rain	Rainfall Greatest fall in one day	Rainfall Average for 10 years inches	Dates on which snow fell
Nicosia District:							
Nicosia	89.17	63.40	0.04	1	0.04	0.28	—
Athalassa	—	—	0.61	2	0.58	0.64	—
Morphou	96.00	60.66	—	—	—	0.18	—
Makhæras	—	—	—	—	—	0.20	—
Famagusta District:							
Famagusta	90.97	64.97	—	—	—	0.22	—
Akhyritou	88.30	63.40	0.04	1	0.04	0.18	—
Rizokarpaso ...	—	—	0.30	1	0.30	0.28	—
Lefkoniko	—	—	1.75	1	1.75	0.50	—
Larnaca District:							
Larnaca	91.00	62.00	0.76	1	0.76	0.48	—
Lefkara	—	—	0.48	2	0.40	0.66	—
Limassol District:							
Limassol	87.77	62.13	—	—	—	0.03	—
Saittas	—	—	—	—	—	0.91	—
Trikoukkia	—	—	—	—	—	0.93	—
Alekhtora	—	—	0.12	1	0.12	0.15	—
Paphos District:							
Paphos	—	—	—	—	—	0.16	—
Polis...	—	—	0.12	1	0.12	0.35	—
Kyrenia District:							
Kyrenia	85.24	67.80	—	—	—	0.30	—

OCTOBER, 1936.

Nicosia District:							
Nicosia	86.39	60.81	0.04	2	0.02	0.59	—
Athalassa	—	—	—	—	—	0.61	—
Morphou	93.90	51.61	0.20	3	0.12	0.32	—
Makhæras	—	—	—	—	—	0.86	—
Famagusta District:							
Famagusta	81.48	63.87				0.85	—
Akhyritou	89.20	59.60				0.69	—
Rizokarpaso ...	—	—	0.10	1	0.10	0.81	—
Lefkoniko	—	—				0.11	—
Larnaca District:							
Larnaca	85.00	62.00	0.10	2	0.08	0.85	—
Lefkara	—	—	0.15	1	0.15	0.93	—
Limassol District:							
Limassol	84.39	60.00	—	—	—	0.84	—
Saittas	—	—	0.22	1	0.22	0.69	—
Trikoukkia	71.85	46.30	0.53	2	0.45	1.85	—
Alekhtora	—	—	—	—	—	0.82	—
Paphos District:							
Paphos	—	—	—	—	—	0.88	—
Polis...	—	—	0.94	2	0.53	1.04	—
Kyrenia District:							
Kyrenia	75.14	64.11	0.17	1	0.17	0.79	—

Note.—Compiled from returns furnished by Public Works Department.

NOVEMBER, 1936.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall Total inches	Rainfall No. of days rain	Rainfall Greatest fall in one day	Rainfall Average for 10 years inches	Rainfall Dates on which snow fell
Nicosia District:							
Nicosia	73.73	51.93	0.84	6	0.37	1.07	—
Athalassa	—	—	0.36	2	0.33	0.91	—
Morphou	92.00	51.30	1.74	7	0.38	0.89	—
Makheras	—	—	1.00	1	1.00	2.02	—
Famagusta District:							
Famagusta	78.00	53.00	1.30	6	0.85	1.80	—
Akhyritou	74.10	51.60	1.47	5	1.20	1.38	—
Rizokarpaso ...	—	—	1.90	5	0.50	2.59	—
Lefkoniko	—	—	1.19	4	0.60	1.15	—
Larnaca District:							
Larnaca	74.00	54.60	0.50	5	0.20	1.64	—
Lefkara	—	—	1.20	3	0.90	2.65	—
Limassol District:							
Limassol	75.13	54.47	0.80	8	0.53	1.85	—
Saittas	—	—	1.30	6	0.43	1.40	—
Trikonkkia... ...	61.20	41.30	2.16	8	0.49	1.96	—
Alekhtora	—	—	—	—	—	1.85	—
Paphos District:							
Paphos	—	—	—	—	—	1.96	—
Polis...	—	—	2.88	7	1.20	1.58	—
Kyrenia District:							
Kyrenia	70.13	57.17	2.62	8	1.04	2.61	—

Note.—Compiled from returns furnished by Public Works Department.

Department of Agriculture, Cyprus.

HEADQUARTERS—NICOSIA.

ALL general correspondence should be addressed to the Director of Agriculture.

Correspondence and applications for advice referring to the Veterinary, Entomological, Plant Pathological or Chemical Branches, should be addressed to the Officer in charge of the Branch. When seeking advice in regard to treatment of plant pests or diseases, specimens should, whenever possible, be sent.

GOVERNMENT STOCK FARM, ATHALASSA AND DISTRICT STUD STABLES.

Applications for services of stud animals at Athalassa or the supply of live stock, poultry, eggs, etc., should be addressed to the Manager, Stock Farm, Athalassa. Applications for services of stud animals at District Stud Stables should be made to the Stud Groom in charge. There are Stud Stables at Famagusta, Vatili, Rizokarpaso, Ayios Theodhoros, Lefkoniko, Larnaca, Limassol, Paphos and Polis.

CENTRAL EXPERIMENT FARM, MORPHOU.

Applications for permission to visit the Central Experiment Farm, Morphou, should be made to the Officer in Charge of the Farm.

SAITTA EXPERIMENTAL VINEYARD AND VITICULTURIST'S LABORATORY.

Requests for the examination of wines and advice in regard to viticulture should be addressed to the Viticulturist and Wine Expert, Limassol.

DISTRICT ORGANIZATION.

Applications for agricultural advice should be addressed to the Officer in charge of the district or area in which the applicant resides. All applications for seeds or plants should be made to the Officer in charge of the nearest Nursery Garden.

NICOSIA DISTRICT.

Agricultural Officer, Mr. S. Maratheftis, is in charge of the district, including the Nursery Garden, Nicosia, and Officers are stationed at Kythrea, Dheftera and Morphou.

Lefka Sub-District.—Agricultural Officer, Ibrahim Hakki Effendi, is in charge, including Pyrgos area.

FAMAGUSTA DISTRICT.

Agricultural Officer, Mr. A. Panaretos, is in charge, including Famagusta Nursery Garden and Citrus Experimental Grove. Officers are stationed at Yialousa, Lysi, Lefkoniko and Trikomo and Tobacco Instructor at Yialousa.

LARNACA AND LIMASSOL DISTRICTS.

Agricultural Officer, Mr. M. Papaiacovou, is in charge, including Larnaca Nursery Garden. Officers are stationed at Larnaca, Skarinou, Nisou, Agros and Limassol.

KYRENIA DISTRICT.

Agricultural Assistant, Mr. E. Kyprianides, is in charge, including Kyrenia Nursery Garden, and an officer is stationed at Lapithos.

PAPHOS DISTRICT.

Assistant Superintendent of Agriculture, Mr. A. Klokkaris, is in charge. Paphos District includes Paphos and Polis Nursery Gardens and Officers are stationed at Polis, Stroumbi, Kelokedhara and Ayios Amvrosios (Limassol District).

TROODOS AREA.

Trikoukkia Nursery Garden and Troödos area is in charge of Mr. K. Hamboullas, Agricultural Assistant.